

MITSUBISHI 1993 SEMICONDUCTORS

RF POWER
SEMICONDUCTORS

HIN BOOK





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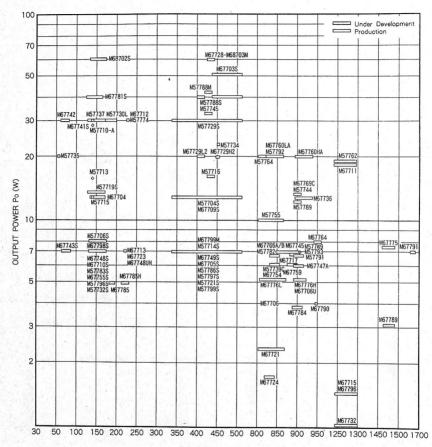


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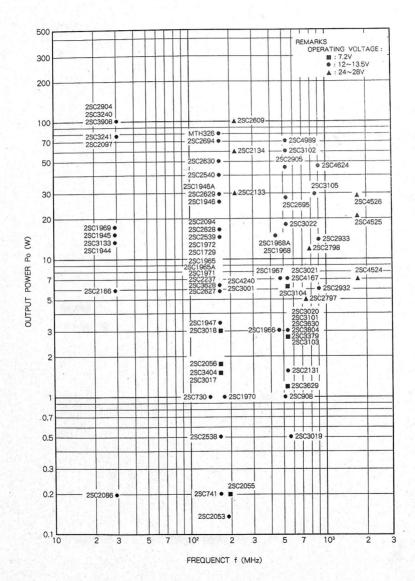
KINDS OF FUNCTION MAP



FREQUENCY f (MHz)



KINDS OF FUNCTION MAP





		Features										Max. R	ating	PKG				
Type No.	Frequency	Func	Set Power		se	f	Ро	GP	ηt	Pin		Vвв	<i>p</i> in	-	3fo	_	Ро	Outline
	Band	tion	(W)	М	Р	MHz	W	dB	%	mW	٧	٧	-	dBc	dBc	٧	W	
M67755L * 4 M67755H * 4	VHF 140	FM	5		0	135~150 150~175	7	35.4	40	2	7.2	5	2.5	-25	-30	9	10	H12
M67748L/LR * 5 M67748H/HR * 5 M67748UH * 5	MHz	FM	5		0	135~150 150~175 220~225	7	25.4	40	20	12.5	5	2.5	-20	-25	15	9	H27
M67798L ★★		FM	5	3 .	0	144~148	7	25.4	50	20	9.6	3.5	3	-25	-30	16	10	* 1
M67704 * 6	84.	FM	10	0		142~175	13	28.1	40	20	12.5	5	2.5	-20	-30	16	20	H16
M67741L * 7 M67741H * 7		FM	25	0		135~150 150~175	30	21.7	40	200	12.5	-	3.3	-25	-30	17	35	H2
M67781L M67781H		FM	35	0		135~160 150~175	40	21.2	40	300	12.5	-	3	-30	-30	16	50	H2
M68702L ★★ M68702LR ★★ M68702H ★★		FM	50	0		135~160 135~160 150~160	60	23.0	40	300	12.5	=	3	-30	-30	17	70	Н2
M67799M ★★	UHF	FM	- 5		0	430~450	7	25.4	45	20	9.6	3.5	3	-25	-30	16	10	* 1
M67749GL ** M67749EL ** M67749SL ** M67749ULR M67749L/LR M67749L/LR M67749H/HR M67749H/HR M67749H/HR M67749H/HR M67749H/HR	400 MHz	FM	5		0	326~346 335~360 335~360 350~370 360~390 390~420 400~430 430~450 440~470 470~490 490~512	7	25.4	35	20	12.5	5	2.5	-20	-25	15	10	H27
M67729L2		FM	15	0		400~420	20	21.2	35	150	12.5	-	2.8	-30	-30	16	30	H18
M57788L M57788H M57788UH M57788SH		FM .	35	0		400~430 450~470 470~490 490~512	40	21.2	40	300	12.5		3.5	-30	-30	17	50	НЗ
M68703M ★★		FM	50	0	100	430~450	-	23.0				- 12	3	-30	-30	17	70	100

Note, ** Under development, M: for MOBILE, P: for PORTABLE. PKG outline: see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 1: MOSFET 30 × 10mm

* 1 : MOSFEL 3U x I Umm

* 2 : Spin type

* 3 : MCA Handy

* 4 : High gain type to M57785 series

* 5 : High gain, small package type to M57732, M57796 series

* 6 : High gain, small package type to M57719

* 7 : Wide band to M57741 series



	Appl						Max. Ra	ating	PKG					
Type No.	Frequency	Func	Set	- f	Po	Pin	Vop	ηt	ρin	.2fo	3fo	Vcc	Po	Outline
	Band	tion	Power (W)	MHz	W	mW	٧	%	-	dBc	dBc	٧	W	Outline
M67729L2	400MHz		7.7	400~420	20	150	12.5/12.5	35	2.8			16	30	H18
M67729H2		FM	15	450~460	20	150	12.5/12.5	35	2	- 30	- 30	16	30	H18
M57734	1			453~458	25	300	12.5/12.5/12.5	40	2.5			17	35	НЗ
M57782	AMPS		-41.5		7	1	8/8/12.5						10	H11
M67754		FM	3	824~849	6	1	8/8/12.5	0.5	20	-00	000	17	10	H11
M57739C		100			6	30	12.5/12.5	35	2.8	- 30	- 30		12	H26
M67724		FM	0.6	824~849	1.6	1	7.2/7.2/7.2	4.6		Table 1	100	9	3	H25 -
M67717	ETACS	- FV4	3	872~905	7	1	8/8/12.5	35	2.8	- 30	- 30	17	10	H11
M67759		FM 3	3	872~905	6	1	8/8/12.5	33	2.0	- 30	- 30		10	AII
M57791	TACS	FM	3	890~915	7	1	8/8/12.5	35	2.8	- 30	- 30	17	10	H11
M57789	NMT900	51.4	_	000 015	12	5	12.5/8/12.5	30	2.8	20	20	17	20	НЗ
M67769C	1,111,1000	FM	6	890~915	13	1	8/8/12.5	30	2.8	- 30	- 30	17	18	НЗ
M67747A	DDI	FM	3	898~925	7	.1	8/8/12.5	35	2.8	- 30	- 30	17	10	H11
M67764	CRP		4	940~960	8	2	8/12.5/12.5	35	2.8	- 30	- 30	17	10	H11
M67790		FM	2	945~951	4	1	6/8/8	30	3	- 30	- 30	10	6	H11
M67766A	D-AMPS	PSK	3	824~849	6	2	8/8/8/12.5	20	3	- 30	- 30	15.5	10	H3 * 8



Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 8 : 6pin type

			Appli	cations	(1) a					Fea	tures	_					Max. R	ating	PKG
Type No.		Frequency	Func	Set	U	se	f	Ро	GP	ηt	Pin	Vcc	Vвв	ρ in	2fo	3fo	Vcc	Po	Outline
	- (Band	tion	Power (W)	М	Р	MHz	W	dB	%	mW	٧	٧		dBc	dBc	٧	W	
M57735	7	VHF6m	SSB	10	0		50~54	19	19.7	40	200	12.5	9	2.2	-25	-30	17	25	НЗ
M67743L M67743H		VHF MID	FM	5		0	68~81 77~88	7	23.6	38	30	12.5	5	4	-18	-25	15	10	H13
M67742		BAND	FM	25	0	9.7	68~88	30	17.7	40	500	12.5	-	3	-25	-30	17	40	H2
M57785L M57785M M57785H		VHF 140 MHz	FM	5		0	135~150 150~162 162~174	7	21.4	40	50	7.2	5	2.5	-20	-30	10	10	H12
	9						135~150 150~175	7	35.4	40	2	7.2	5	2.5	-25	-30	9	10	H12
M57783L M57783H			FM	5		0	135~160 150~175	7	21.4	45	50	7.5	5	2.5	-20	-30	9	10	H13
M67710L M67710H			FM	5		0	135~160 150~175	7	21.4	40	50	9.6	5	2.5	-20	-30	16	10	Н13
M57796MA M57796L M57796H			FM	5		0	144~148 135~150 150~175	7	15.4 13.6 13.6	50	200 300 300	12.5	5	2.5	-20	-30	16	10	H14
M57732L M57732	18		FM	5		0	135~160 144~175	7	25.4	40	20	12.5	5	2.5	-20	-30	16	10	H12
M67748LR 3	* 10 * 10 * 10 * 10		FM	5		0	135~150 135~150 150~175 150~175	7	25.4	40	20	12.5	5	2.5	-20	-25	15	9	H27 H27R H27 H27R
M57706L M57706			FM	5	0		135~145 145~175	8	16.0	35	200	12.5	-	4	-15	-25	17	14	H2
M57715 M57715R M57747			FM	10	0		144~148	13	18.1	48	200	12.5	-	2.8	-25	-30 -30 -35	17	20	H2 H2R H6
M57713 ×	k 11		SSB	10	0	34	144~148	17	19.2	40	200	12.5	9	2.2	-25	-30	17	26	НЗ
M67704 ×	12		FM	10	0	1.48	142~175	13	28.1	40	20	12.5	5	2.5	-20	-30	16	20	H16
M57719L M57719N M57719			FM	10	0		135~145 142~163 145~175	14	18.4	40	200	12.5	-	4	-25	-35	17	20	, H2
M57710-A	× 13		FM	25	0	775	156~160	28	21.4	45	200	12.5	-	2.8	-25	-	17	40	H2
M57737			FM	25	0	1	144~148	30	21.7	45	200	12.5	- 1	2.8	-25	-30	17	40	H2
M57727	* 11		SSB	25	0	10.10	144~148	37	20.9	50	300	12.5	9	2.2	-25	-30	17	40	НЗ

Note. M: for MOBILE, P: for PORTABLE. PKG outline: see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

9: High gain type to M57755 series

10: High gain, small package type to M57732, M57796 series

11: All mode type

12: High gain, small package type to M57719 series

13: For Marine Radio



		Appli	cations						Fea	tures	3					Max. R	ating	PKG
Type No.	Frequency	Func	Set Power	U	se	f	Ро	GP	ηt	Pin	Vcc	Vвв	ρ in	2fo	3fo	Vcc	Po	Outline
	Band	tion	(W)	М	Р	MHz	W	dB	%	mW	٧	٧	-	dBc	dBc	٧	W	Oddine
M57741UL M57741L M57741M M57741H	VHF 140 MHz	FM	25	0		135~148 146~160 156~168 164~175	28	21.4 21.4 20.4 19.7	40	200 200 250 300	12.5	1	3.3	-25	-30	17	35	Н2
M67741L * 14 M67741H * 14		FM				135~150 150~175	30	21.7	40	200	12.5	-	3.3	-25	-30	17	35	Н2
M67781L M67781H		FM	35	0		135~160 150~175	40	21.2 21.2	40	300	12.5	-	3	-30	-30	17	50	Н2
M57726 M57726R		FM	35	0		144~148	43	20.3	50	400	12.5	-	2.8	-35	-45	1.7.	55	H2 H2R
M67727 * 15		SSB	45	0		144~148	60	20.7	50	500	12.5	9	2.8	-30	-35	16	78	H17
M67702		FM	50	0	5-1	150~175	60	10.7	40	5000	12.5	-	2.8	-30	-35	17	90	H17
M67785 M67785H	VHF BAND II	FM	3		0	186~200 220~240	5	24.0	40	20	9.6	5	2.5	-25	-30 -25	13	6	H12
M67713 M67723		FM	5		0	220~225	7	12.4 25.4	45	500 20	12.5	5	2.5	-20	-30	16	10	H14 H13
M67730L		FM	25	0		175~200	30	20.0	43	300	12.5		2.8	-30	-35	17	40	H2
M57774 M67712 * 15		FM SSB	25	0		220~225	30	20.0	43	300	12.5	9	2.8	-30	-35	17	40	H2 H3
M57786UL M57786L M57786M M57786H	UHF 400 MHz	FM				360~380 400~430 430~470 470~512	6 7 7 7	20.7 21.4 21.4 21.4	40 40	50	7.2	5	2.5	-25	-30	10	10	H12
M57799L1 M57799L2 M57799L M57799M M57799H		FM	5		0	335~360 360~400 400~430 430~470 470~512	6	21.7 21.7 21.7 21.7 21.7	35 40 40	40	7.5	5	3 2.5 2.5 2.5		-30	9	9	Н13
M67705UL M67705L M67705M M67705H		FM				380~400 400~430 430~470 470~512	7	25.4	40	20	9.6	5	2.5	-25	-30	13	10	н13



Note. M: for MOBILE, P: for PORTABLE. PKG outline: see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 14: High power, wide band type to M57741 series

* 15: All mode type

1000	100	Appli	cations						Fea	tures	3					Max. R	ating	PKG
Type No.	Frequency	Func	Set	U:	se	f	Po	GP	ηt	Pin	Vcc	Vвв	ρ in	2fo	3fo	Vcc	Po	Outline
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Band	tion	Power (W)	М	Р	MHz	W	dB	%	mW	٧	٧	-	dBc	dBc	٧	W	Oddine
M57797MA	UHF	0				430~450		18.4		100	- 1		2.5					
M57797SL	400			-21,7		350~380	÷	15.4		200			4.4					
M57797UL	MHz					380~400	-	15.4		200			2.5					
M57797L		FM	100	1 1		400~430	7	15.4	40	200	12.5	5	2.5	-25	-30	16	10	H14
M57797H				1		450~470		15.4		200			2,5					
M57797UH				- 1		470~490		15.4		200			2.5					
M57797SH						490~512		15.4		200			2.5					
M57721L		9				350~400			7				10					
M57721M	*	FM				400~450	7	28.4	40	10	12.5	5	2.5	-30	-35	16	10	H12
M57721		146	_	0.4		450~512												
M67749SLR *16			5	11	0	335~360	1						7 = 7			Ī.,		
M67749ULR #16			15.			360~380	34			1								
M67749L +16	11 - 12 - 1					400~430					١.							
M67749LR #16			100			400~430											1	
M67749M ±16	NAME OF STREET			1	1	430~450	_								00			
M67749MR +16		FM				430~450	7	25.4	35	20	12.5	5	2.5	-25	-30	15	10	H27
M67749H *16				100		450~470												
M67749HR #16						450~470	1											
M67749UHR +16		1			1	470~490	8.						. 16.5			1		A .
M67749SHR +16★						490~512				1		1		8.				
M57714EL				7.5	-50	335~360	1,			١.			-			1		
M57714EL			- 11			360~380			-	-			1.		1			
M57714UL				1		380~400	1					1			-			
M57714L			100	S		400~420					-							
M57714M		FM	5	0		430~450	7	18.4	38	100	12.	5 -	2	-30	-30	17	12	H3
M57714W			1	1	-	450~470				15		1	1.	1				
M57714UH				1		470~490	.				1:		100					
M57714SH						490~512		1					1					
M67709L * 17				1		350~390			1		1	1	-	-				
M67709M * 17		·	1.0	1	1-5	390~430	10	21 1	25	1,0	12		20	200	20	10	20	1110
M67709H * 17		FM	10	0		430~470	13	31.1	35	10	12.	5	2.8	-30	-30	16	20	H16
M67709SH * 17			1			470~512		-		1	1	1	1		-			

Note. **Under development, M: for MOBILE, P: for PORTABLE. PKG outline: see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 16: High gain, small package type to M57721, M57797 series

* 17: High gain, small package type to M57704 series



		Appli	cations			1 11			Fea	tures	5					Max. R	ating	PKG
Type No.	Frequency	Func	Set Power	U	se	f	Ро	GР	ηt	Pin	Vcc	V _{BB}	ρ in	2fo	3fo	Vcc	Po	Outline
	Band	tion	(W)	М	Р	MHz	W	dB	%	mW	٧	٧	_	dBc	dBc	٧	W	Outime
M57704EL	UHF				- 1	335~360			35								. 1	
M57704SL	400		10 de 10			360~380			35				,			,		
M57704UL	MHz					380~400			35									
M57704L						400~420			35				-					
M57704M		7				430~450			35			7						
M57752 * 18		FM	10	0		430~450	13	18.1	40	200	12.5	-	2.8	-30	-30	17	20	НЗ
M57704MR * 20			200	. The same		430~450			35									
M57704H			1			450~470			35				17					
M57704UH	The state of		300	. 1	87	470~490			35									
M57704SH			Sec.		107	490~512			35				-		1.			
M57716 * 19		SSB	10	0	1000	430~450	17	19.2	35	200	12.5	9	2.5	-30	-30	17	128	Н3
M67729L2 M67729H2		FM	15	0		400~420 450~460	20	21.2	35	150	12.5	-	2.8	-30	-30	16	30	H18
M57734		FM	15	0		453~458	25	19.2	40	300	12.5	-	2.5	-30	-30	17	35	Н3
M57729EL M57729SL M57729UL M57729L M57729 M57729H M57729UH M57729SH		FM	25	0		335~360 360~380 380~400 400~420 430~450 450~470 470~490 490~512	30	20.0	40	300	12.5	_	2.8	-30	-30	17	40	нз
M57745 * 19		SSB	25	0	The state of	430~450	33	20.4	40	300	12.5	9	2,5	-30	-30	17	40	НЗ
M57788L M57788M M57788MR * 20 M57788H M57788UH M57788SH		FM	35	0		400~430 430~450 430~450 450~470 470~490 490~512	45 45 40 40	21.2 20.5 20.5 21.2 21.2 21.2	40	400 400 300 300	12.5 13.5 13.5 12.5 12.5 12.5	-	3.5 2.8 2.8 3.5 3.5 3.5	-30	-30	17	50	НЗ
M67703H M67703UH M67703SH		FM	45	0		450~470 470~490 490~512	50	7.0	40	10₩	12.5		2.8	-30	-35	17	80	Н17
M67728		SSB	45	0	8.78	430~450	60	7.7	40	10₩	12.5	9	2.8	-30	-35	16	78	H17



Note. M: for MOBILE, P: for PORTABLE. PKG outline: see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec, sheet for precise information. * 18 : High effciency type * 19 : All mode type * 20 : Reverse pin type

	1.2	Appli	cations						Fea	tures						Max. R	ating	PKG
Type No.	Frequency	Func	Set	U	se	f	Ро	GP	ηt	Pin	Vcc	Vвв	ρ in	2fo	3fo	Vcc	Po	Outline
	Band	tion	(W)	М	Р	MHz	W	dB	%	mW	٧	٧	-	dBc	dBc	V	W	Oddinie
M57775 M57776	UHF 800	FM	Exiter Use	0	3.	806~866 890~915	0.2 0.3	23.0	*21	1 1.5	8		3.0 2.8	-30	-30	15	0.8	Н8
M67706 M67706U	MHz	FM	2		0	806~870 896~941	4	16.0	30	100	7.5	-	4	-30	-30	10 9	5	Н13
M67776L M67776H		FM	3	11-1	0	806~870 896~941	5	37.0	30	1	7.2	-	3	-30	-30	9.2	8	H11
M57755		FM	8	0		806~866	10	20.0	35	100	12.6	-	2.8	-30	-30	17	16	НЗ
M67736		FM	10	0		896~941	12	33.8	30	5	12.5	8	2.8	-30	-30	17	20	Н3
M57764		FM	15	0		806~825	20	16.9	30	400	12.5	-	2.8	-30	-30	17	25	НЗ
M57792		FM	15	0	16	806~870	20	16.9	30	400	13.5	-	2.8	-30	-30	17	30	НЗ
M57749 * 22		FM	5	0	1 11 1	903~905	7	15.4	30	200	12.5	-	2.5	-30	-30	17	10	НЗ
M57793 * 22		FM	5	0		903~905	7	38.5	35	1	12.5	-	2.5	-30	-30	17	10	H11
M67745		FM	5	0		846~903	7	35.4	35	2	12.5	-	2.8	-30	-30	17	10	H11
M67761		FM	5	TOY .	0	893~901	7	38.5	35	1	7.2	-	2.5	-30	-30	9.2	9	H11
M67784		FM	3	100	0	889~915	3.8	35.7	35	1	9.6	-	2.8	-30	-30	12	6	. H25
M57744		·FM	10	0		889~915	13	16.3	30	300	12.5	-	2.5	-25	-30	17	18	H3
M67783 * 23	UHF	FM	1	185	0	1240~1300	1.4	23.0	20	7	7.2	-	3.5	-28	-	15	2.5	H27
M67715 * 24	1.2	SSB	1		0	1240~1300	1.2	20.7	18	10	8	8	2.5	-30	-35	16	4	H13
M67732 * 25	GHz	FM	1		0	1240~1300	1	21.5	25	7	7.2	-	2.5	-30	-	16	2	H13
M67711		FM	10	0		1240~1300	16	12.0	30	1000	12.5	9	2.0	-45	-	17	20	НЗ
M57762		SSB	10	0	1	1240~1300	18	12.5	30	1000	12.5	9	2.0	-45	-	17	20	НЗ
M67775	UHF 1.4 GHz	FM	5	0	100	1465~1477	7.5	35.7	30	2	13.5	8	2.8	-25	-30	16	10	НЗ

Note. M : for MOBILE, P : for PORTABLE PKG outline : see references "Package outline".

Specifications are shown in minimum values. Please refer to each spec, sheet for precise information. * 21 : It ≤ 230mA @ Po = 0.2W

* 22 : Personal radio * 23 : Small package type * 24 : Driver stage for M57762 * 25 : Driver stage for M67711

FOR CITIZEN'S BAND TRANSCIEVER, 27MHz 12V SERIES (Tc = 25 °C)

			1.0	M	aximu	ım Ra	tings		Ісво		Po (mir	n)		ηс	Ć
Type No.	Aplication	Structure	Vcво (V)	VEBO (V)	lc (A)	Pc (W)	Tj (℃)	R _{th-c} (°C/₩)	(max) (µ A)	Vcc (V)	f (MHz)	Pin (W)	(W)	(min) (%)	Package outline
2SC2086	HPA	Si, NPN, EP	75	4	- 1	0.8 +1	+ 135	137.5 #2	100	12	27	0.015	0.3	50	T-1B
2SC2166	HPA	Si, NPN, EP	75	5	4	12.5	+ 150	10	100	12	- 27	0.25	6	55	T-30
2SC1944	HPA	Si, NPN, EP	80	5	6	20	+ 150	6.25	100	12	27	1	13	55	T-30
2SC1945	HPA	Si, NPN, EP	80	5	6	20	+ 150	6.25	100	12	27	0.5	14	60	T-30E
2SC1969	HPA	Si, NPN, EP	60	5	6	20	+ 150	6.25	100	12	27	1	16	60	T-30
2SC3133	HPA	Si, NPN, EP	60	5	6	20	+ 150	6.25	100	12	27	0.5	13	60	T-30E

^{* 1 :} Ta = 25 ℃, * 2 : Rth-a

FOR MOBILE RADIOS, 13.5V SERIES (Tc = 25 °C)

2SC2097	HPA	Si, NPN, EP	50	5	15	150	+ 175	1.2	5000	13.5	30	4	75	55	T:40E
2SC3241	HPA	Si, NPN, EP	50	5	18	180	+ 175	0.83	5000	12.5	30	4	75	55	T-45E
2SC2904	HPA	Si, NPN, EP	50	5	22	200	+ 175	0.75	5000	12.5	30	7	100	55	T-40E
2SC3908	HPA	Si, NPN, EP	50	5	22	200	+ 175	0.75	5000	12.5	30	7	100	55	T-40E
2SC3240	HPA	Si, NPN, EP	50	5	25	270	+ 175	0.556	5000	12.5	30	7	100	55	T-45E

28V SERIES TO FIXED STATION APPLICATIONS (Tc = 25 °C)

2SC2133	*	HPA	Si, NPN, EP	55	4	5	75	+ 175	2.0	2000	28	220	4.5	30	55	T-40E
2SC2134	*	HPA	Si, NPN, EP	55	4	10	120	+ 175	1.25	5000	28	220	12	60	55	T-40E
2SC2609	*	HPA	Si, NPN, EP	55	4	15	170	+ 175	0.88	10000	28	220	25	100	55	T-40E

^{* :} Communication grade

150/400MHz BAND 7.2V SERIES FOR MOBILE RADIOS ($T_c = 25 \, ^{\circ}$ C)

2SC2055	HPA	Si, NPN, EP	18	4	0.3	0.5 *1	+ 135	220 #2	30	7.2	175	0.01	0.2	50	T-1B
2SC3404	HPA	Si, NPN, EP	20	3.5	1	5	+ 175	30	200	7.2	175	0.08	1.5	55	T-46
2SC3017	HPA	Si, NPN, EP	20	3.5	. 1	4	+ 175	37.5	200	7.2	175	0.1	1.5	55	T-8E
2SC2056	HPA	Si, NPN, EP	18	4	0.6	. 4	+ 175	37.5	100	7.2	175	0.2	1.6	55	T-8E
2SC3018	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	. 15	300	7.2	175	0.15	3	55	T-31E
2SC3001	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	175	0.3	6	60	T-31E
2SC4240	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	175	0.3	6	60	T-46
2SC3629	HPA	Si, NPN, EP	20	3.5	1	5	+ 175	30	200	7.2	520	0.2	1.2	55	T-46
2SC3103	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	15	300	7.2	520	0.6	2.8	55	T-31E
2SC3379	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	15	300	7.2	520	0.6	2.8	55	T-46
2SC3104	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	520	2	6	60	T-31E

^{* 1 :} Ta = 25 ℃, * 2 : Rth-a

UHF BANDWIDTH RANGE 24V SERIES FOR LINEAR AMPLIFIER (Tc = 25 °C)

2SC2797	*	HPA	Si, NPN, EP	45	4	1	10	+ 175	15	400	24	770	1	5	55	T-41
2SC2798	*	HPA	Si, NPN, EP	45	4	2	30	+ 175	5	1000	24	770	3	12	55	T-41
2SC2799	*	HPA	Si, NPN, EP	45	4	4	50	+ 175	3	1500	24	770	8	25	55	T-41E

^{* :} Communication grade



150MHz BAND 13.5V SERIES FOR MOBILE RADIOS ($T_c = 25 \, ^{\circ}$ C)

	8		4	N	laxim	ım Ra	tings		Ісво		Po (mi	1)		ηс	
Type No.	Structure	Aplication	VcBo (V)	VEBO (V)	lc (A)	Pc (W)	Tj (℃)	Rth-c (°C/₩)	(max) (µA)	Vcc (V)	f (MHz)	Pin (W)	(W)	(min) (%)	Package outline
2SC2053	HPA	Si, NPN, EP	40	4	0.3	0.6 #1	+ 135	183 #2	20	13.5	175	0.004	0.15	40	T-1B
2SC741 *3	HPA	Si, NPN, EP	40	4	0.3	2.5	+ 175	60	1	13.5	150	0.01	0.2	50	T-8C
2SC2538	HPA	Si, NPN, EP	40	4	0.4	3	+ 135	36.7	100	13.5	175	0.05	0.5	45	T-1B
2SC730 *3	HPA	Si, NPN, EP	40	4	0.4	3	+ 175	50	10	13.5	150	0.1	1	50	T-8
2SC1970	HPA	Si, NPN, EP	40	4	0.6	5	+ 150	25	100	13.5	175	0.12	1	50	T-30
2SC1947 * 4	HPA.	Si, NPN, EP	35	4	1	10	+ 175	15	500	13.5	175	0.3	3.5	50	T-8E
2SC2627	HPA	Si, NPN, EP	35	4	. 2	20	+ 175	7.5	1000	12.5	175	0.25	5	60	T-41
2SC2237	HPA	Si, NPN, EP	35	4	2	20	+ 175	7.5	500	13.5	175	0.25	6	60	T-31E
2SC3628	HPA	Si, NPN, EP	35	4	2	20	+ 175	7.5	500	13.5	175	0.25	6	60	T-46
2SC1971	HPA	Si, NPN, EP	35	4	2	12.5	+ 175	10	500	13.5	175	0.6	6	60	T-30E
2SC1965 * 4	HPA	Si, NPN, EP	35	4	1	15	+ 175	10	500	13.5	175	0.6	6	50	TC-17
2SC2539	HPA	Si, NPN, EP	35	4	4	35	+ 175	4.3	1000	13.5	175	0.5	14	60	T-31E
2SC1729	HPA	Si, NPN, EP	35	4	3.5	35	+ 175	4.3	1000	13.5	175	1.4	14	60	T-31E
2SC1972	HPA	Si, NPN, EP	35	4	3.5	25	+ 175	6	1000	13.5	175	2.5	14	60	T-30E
2SC2628	HPA	Si, NPN, EP	35	4	4	40	+ 175	3.75	2000	12.5	175	1	15	60	T-41
2SC2094	HPA	Si, NPN, EP	40	4.5	3.5	30	+ 175	5	2000	13.5	175	2	15	60	T-31E
2SC1946	HPA	Si, NPN, EP	35	4	7	50	+ 175	3	2000	13.5	175	6	28	60	T-31E
2SC1946A	HPA	Si, NPN, EP	35	4	7	50	+ 175	3	2000	13.5	175	3	30	60	T-31E
2SC2629	HPA	Si, NPN, EP	35	4	8	60	+ 175	2.5	3000	13.5	175	3.5	30	60	T-41
2SC2540	HPA	Si, NPN, EP	35	4	10	75	+ 175	2	2500	13.5	175	6	40	60	T-40E
2SC2630	HPA	Si, NPN, EP	35	4	14	100	+ 175	1.5	5000	12.5	175	10	50	60	T-40E
2SC2694	HPA	Si, NPN, EP	35	4	20	140	+ 175	1.07	5000	12.5	175	15	70	60	T-40E
MTH326 ★★	HPA	Si, NPN, EP	35	4	25	185	+ 175	0.8	5000	12.5	175	15	80	60	T-40E

^{* 1 :} Ta = 25°C, * 2 : Rth-a

^{*3:} High-reliability Communication grade

^{* 4 :} Communication grade

^{**:} Under development

400MHz BAND 13.5V SERIES FOR MOBILE RADIOS (Tc = 25 °C)

				M	aximu	ım Ra	tings		Ісво		Po (mir	1)		ηс	Dealises
Туре Қо.	Structure	Aplication	VcBo (V)	VEBO (V)	lc (A)	Pc (W)	Tj (℃)	Rth-c (°C/₩)	(max) (µ A)	Vcc (V)	f (MHz)	Pin (W)	(W)	(min) (%)	Package outline
2SC3019	HPA	Si, NPN, EP	35	4	0.4	0.9	+ 135	166	500	12.5	520	0.02	0.5	40	T-43
2SC908 * 1	HPA	Si, NPN, EP	40	4	0.5	4.3	+ 175	35	50	1,3.5	500	0.4	1	50	T-8
2SC2131 * 2	HPA	Si, NPN, EP	40	4	0.6	4	+ 175	37.5	100	13.5	500	0.3	1.4	50	T-8E
2SC3101	HPA	Si, NPN, EP	35	4	. 1	10	+ 175	15	300	12.5	520	0.8	3	50	T-8E
2SC3630	HPA	Si, NPN, EP	35	4	1	10	+ 175	15	300	12.5	520	0.8	3	50	T-46
2SC1966	HPA	Si, NPN, EP	35	3.5	1	10	+ 175	15	100	13.5	470	0.5	3	50	T-31E
2SC3020	HPA	Si, NPN, EP	35	4	1	10	+ 175	15	300	12.5	520	0.3	3	50	T-31E
2SC1967	HPA	Si, NPN, EP	35	4	2	20	+ 175	7.5	200	13.5	470	1.5	7	50	T-31E
2SC3021	HPA	Si, NPN, EP	35	4	2	20	+ 175	7.5	500	12.5	520	1.2	7	50	T-31E
2SC4167	HPA	Si, NPN, EP	35	4	- 2	20	+ 175	7.5	500	12.5	520	1.2	7	50	T-46
2SC1968	HPA	Si, NPN, EP	35	4	5	40	+ 175	3.75	500	13.5	470	6	14	50	T-31E
2SC1968A	HPA	Si, NPN, EP	35	4	5	40	+ 175	3.75	500	13.5	470	4	14	50	T-31E
2SC3022	HPA	Si, NPN, EP	35	4	7	50	+ 175	3	2000	12.5	520	6	18	55	T-31E
2SC2695	HPA	Si, NPN, EP	35	4	10	75	+ 175	2	2000	13.5	520	9	28	55	T-31E
2SC2905	HPA	Si, NPN, EP	35	4	15	120	+ 175	1.25	2000	12.5	520	15	45	60	T-40E
2SC3102	HPA	Si, NPN, EP	35	4	18	170	+ 175	0.88	5000	12.5	520	20	60	60	T-40E
2SC4989	HPA	Si, NPN, EP	35	4	20	150	+ 175	1.00	5000	12.5	520	20	70	60	T-40E

^{* 1 :} High-reliability Communication grade

900MHz BAND 12.5V SERIES (Tc = 25 °C)

2SC2932 * 1	HPA	Si, NPN, EP	35	3	2	20	+ 175	7.5	2000	12.5	900	1	6	55	T-31B
2SC2933 * 1	HPA	Si, NPN, EP	35	3	4	40	+ 175	3.75	2000	12.5	900	3	14	50	T-31B
2SC3105 * 1	HPA	Si, NPN, EP	35	3	10	80	+ 175	1.87	5000	12.5	850	15	30	50	T-44
2SC3804 * 1	HPA	Si, NPN, EP	35	3	12	100	+ 175	1.5	5000	13.5	850	20	40	50	T-44
2SC4624 * 2	HPA	Si, NPN, EP	35	2.5	15	110	+ 175	1.36	5000	12.5	900	15	45	45	T-44

^{*:} Common Base * 2: Common Emmiter

L-BAND (1.65GHz) 28V (Tc = 25 °C)

2SC4838	HPA	Si, NPN, EP	50	4	2	17.5	+ 175	8.6	1000	28	1650	0.7	6	45	T-31B
2SC4524	HPA	Si, NPN, EP	50	4	2.5	30	+ 175	5	1000	28	1650	2	7	45	T-31B
2SC4525	HPA	Si, NPN, EP	50	4	5	60	+ 175	2.5	2000	28	1650	5	20	40	X-139
2SC4526	HPA	Si, NPN, EP	50	4	7.5	90	+ 175	1.7	3000	28	1650	10	28	40	X-139

^{* :} Common Base

15V SERIES FOR CATV/MATV AMPLIFIER (Tc = 25 °C)

Type No.	Structure	Aplication		laximu	m Ra	tings		Ісво	100	G _p (mir	1)	100	ηс		
			VcBo (V)	VEBO (V)	10 10 TO	Pc (W)	Tj (℃)	Rth-c (℃/₩)	(max) (µA)	Vcc (V)	f (MHz)	Pin (W)	(dB)	(min) (%)	Package outline
2SC1324 * 1	HPA	Si, NPN, EP	35	4	0.15	3	+ 175	50	50	15	770	0.03	9	, <u>-</u>	T-8

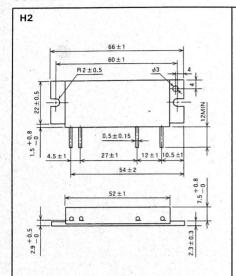
^{* 1 :} High-reliability Communication grade

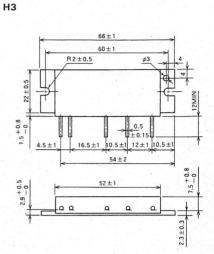


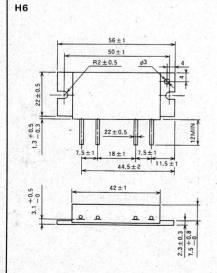
^{* 2 :} Communication grade

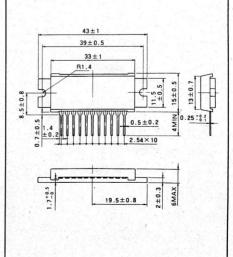
OUTLINE DRAWING

Dimensions in mm





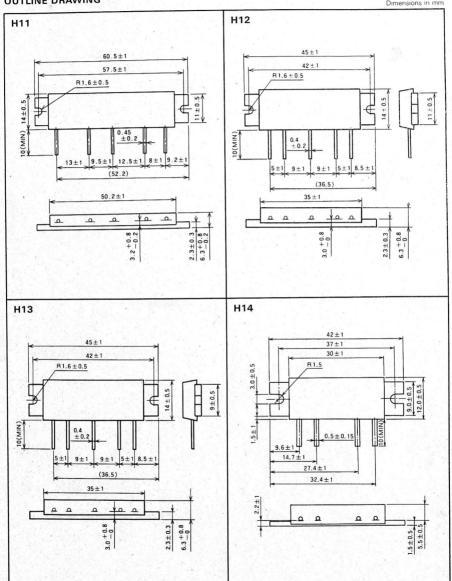




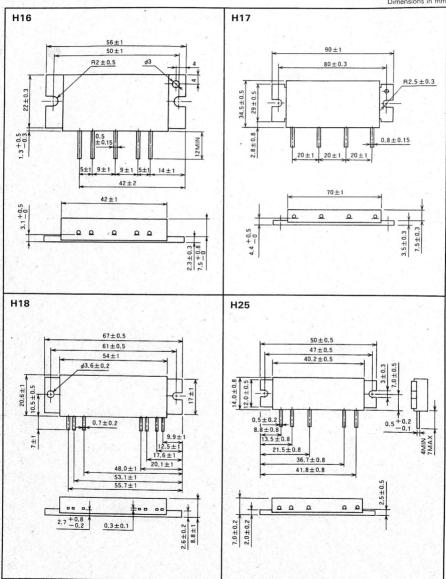


H8

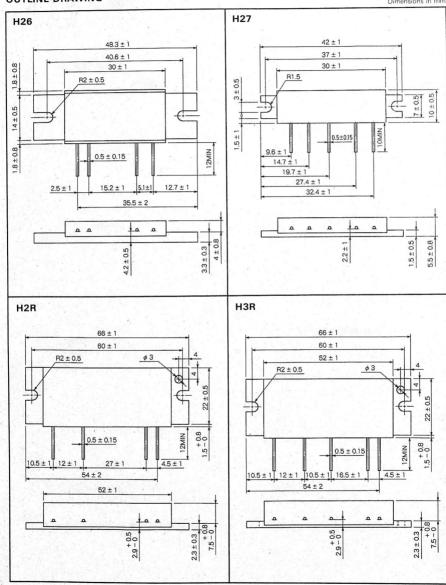
OUTLINE DRAWING



OUTLINE DRAWING



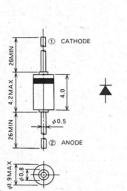
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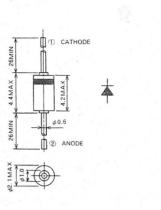
OUTLINE DRAWING Dimensions in mm H27R 42 ± 1 37 ± 1 30 ± 1 R1.5 3 + 0.5 7 ± 0.5 10 ± 0.5 1.5 ± 1 10MIN 0.5±0.15 9.6 ± 1 14.7 ± 1 22.4 ± 27.4 ± 1 32.4 ± 1 2.2 ± 1 1.5 ± 0.5 5.5 ± 0.8

Dimensions in mm

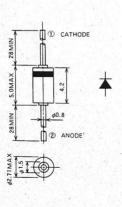




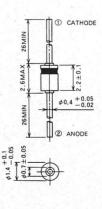
D-2



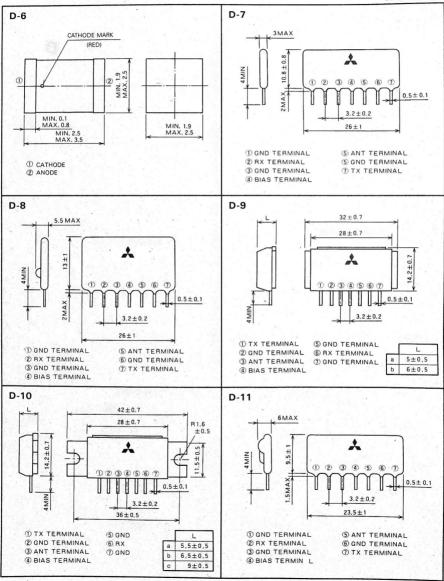
D-3



D-4

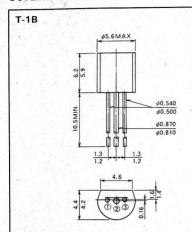


OUTLINE DRAWING



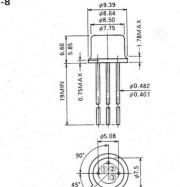
OUTLINE DRAWING

Dimensions in mm



- ① EMITTER
- 2 COLLECTOR 3 BASE

T-8



1 EMITTER

0.863

0.712

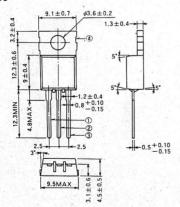
- 2 BASE
- 3 COLLECTOR JEDEC: TO-39

1 14

NOTE T-8C : COLLECTTOR ELECTRODE IS CONNECTED WITH CASE

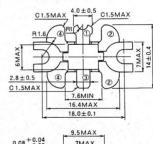
T-8E : EMITTER ELECTRODE IS CONNECTED WITH CASE.

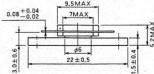
T-30



- T-30
- @ COLLECTOR (FIN)
- 3 EMITTER
- @ FIN (COLLECTOR)
- T-30E
- 1 BASE
- @ EMITTER (FIN) 3 COLLECTOR
- 4 FIN (EMITTER)

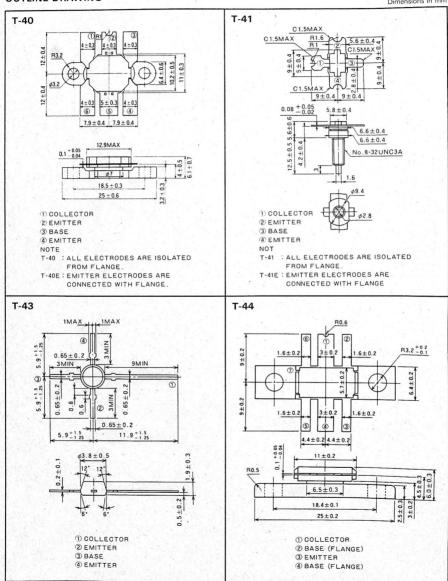
T-31



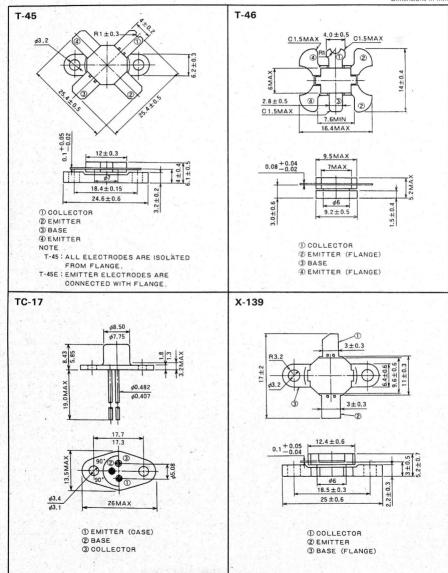


- T-31E:
- 1 COLLECTOR
- @ EMITTER (FLANGE)
- 3 BASE
- @ EMITTER (FLANGE)
- T-31B:
- 1 COLLECTOR 2 BASE (FLANGE)
- 3 EMITTER 4 BASE (FLANGE)

OUTLINE DRAWING



OUTLINE DRAWING



PRECAUTIONS AND RECOMMENDATIONS

GENERAL

Mitsubishi RF Power Modules for mobile radio applications have high reliability and good performance, as they are designed and manufactured under strict quality control.

However, the reliability of semiconductor devices is remarkably affected by usage conditions such as circuit constructions, mounting method, environments, etc.. In order to keep high reliability and obtain good performance when using Mitsubishi RF Power Modules, the following important points concerning maximum ratings, handling, etc., should be noted before use.

1. MAXIMUM RATINGS

Maximum ratings of the RF Power Modules are defined by the "Absolute Maximum Ratings" shown in separate specification sheet. Maximum ratings should not be exceeded in any circumstances, even momentarily. If a device is operated in excess of the absolute maximum ratings, the device may immediately be degraded or destroyed.

Futhermore, in designing an electronic circuit using RF Power Modules, it is necessary to note that the maximum ratings of the devices should not be exceeded even if external conditions are changed.

2. NORMAL OPERATING VOLTAGE

Normal operating voltage is 12.5~13.8 volts for Mitsubishi RF Power Modules, because they are designed for mobile radio applications. The regulated 9 volts is recommended for the base biasing voltage of the modules for linear power amplifiers (for SSB).

3. THERMAL DESIGN

In order to keep high reliability of the equipment, it is better to keep the module temperature low. The case temperature of the module, when operated standard conditions, is lower than 90° C under all severe ambient temperature, recommend normally 60° C.

4. MOUNTING and HANDLING

4-1 When the module is mounted on to a heat sink of a equipment, thermal compound to get good heat sinking should be applied between the module's fin and the heat sink. Following thermal compound for good heat sinking is recommended.

G746 Shinetsu Chemical Industry Co., Ltd.

4-2 When mounting a module to the circuit, do not apply excessive stress to the terminal leads or the fin. In particular, if there are some foreign objects between the module and the heat sink, or if there are some burrs or rising on the surface of the heat sink, it may happen that the substrate of the module will crack or break due to excessive stress from screwing the module on to the heat sink. Therefore, the surface of the heat sink in contact with the module must be as flat as possible.

When screwing a module to the heat sink, torque screw is recommended as 5 to 6kg-cm when using

φ 3mm screws.

- 4-3 For soldering, the major precautions are as follows:
 - 1) Flux -

Roles of flux are to remove oxidized layer on the object, and prevent from oxidation during heating or lowering surface tension on the objects. Rosin flux, which is less corrosional and highly insulative, is recommended.

2) Soldering temperature;

- 3) Cleaning after soldering:
 - The recommended solvent for cleaning the residual flux is the Ethyl Alcohol. Trichlene type solvents should not be used.
- 4-4 When the module is screwed after soldering the terminal leads to the circuit board, excessive stress is applied to the leads. Therefore, please solder the terminal leads to the circuit board after screwing the module to the heat sink.
- 4-5 If the module falls onto a hard surface, it will be damaged by mechanical shock and can no longer be used.
- 4-6 To obtain good stability and electrical performances, it is necessary to take precausions concerning the earth potential of the module. As the fin is the ground terminal, the fin should be connected to the ground of the set completly in RF condition.
- 4-7 The values of input VSWR and output VSWR of the module indicated in the specification sheet are guaranteed when the input and output leads are straight and these leads are connected to the load 50 Ω within 10mm length. If the device is mounted under different conditions from these mentionedabove, the performances, such as output power and efficiency, may be degraded due to the impedance mismatch. In order to reform such an impedance mismatch, please set the additional matching circuits to get good impedance matching.

5. VOLTAGE SUPPLY

The modules have 2 or 3 terminals for DC power supply. If these terminals are combined without RFC (Radio Frequency Choke), or if each terminal is not bypassed with the condenser, parasitic oscillation occasionally may occured. Therefore, the DC Power Supply Terminals should be combined with RFC, and each terminal bypassed with the condensers (10 uF and 4700pF in Parallel).

The first stage transistor of the module even for FM is operated in class AB. When excessively high voltage is applied to the first stage DC Power Supply Terminal, the first stage transistor may be destroyed due to current runaway. Therefore, the first stage supply voltage must be controlled, not exceeding 17 volts DC.

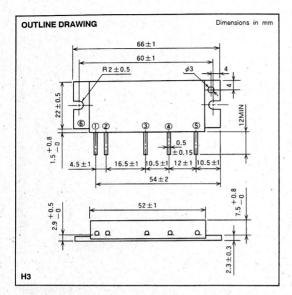


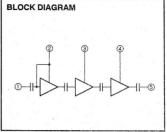
RF POWER MODULES

2

M57704EL

335~360MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ VCC3: 3nd. DC SUPPLY
⑤ PO: RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter .	Conditions	Ratings	Unit
Vcc	Supply voltage		17	. V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	20
Tstg	Storage temperature		- 40~110	90

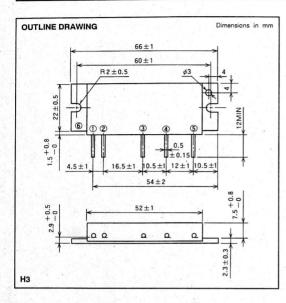
ELECTRICAL CHARACTERISTICS ($T_C = 25 \,^{\circ}\text{C}$ unless otherwise noted)

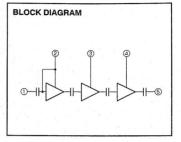
Symbol	Parameter	Test conditions	Limits		1 11
0,111001	1 diameter	rest conditions	Min	Max	Unit
f	Frequency range		335	360	MHz
Po	Output power	Pin = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	13	6. 19 (10)	W
ηт	Total efficiency		35	MATERIAL STATE	%
2fo	2nd. harmonic		dine to the	- 30	dB
Pin .	Input VSWR			2.8	3 (* 3 <u>4</u>
-	Load VSWR tolerance	$ \begin{array}{lll} V_{CC} = 15.2V, \\ P_{O} = 14W \; (P_{In}: controlled) \\ Load \; VSWR=20:1 (All \; phase), 2sec. \\ Z_{C} = 50 \; \Omega \end{array} $	No degradation		_



M57704SL

360~380MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

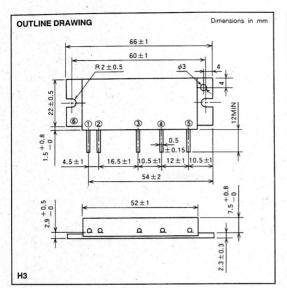
Symbol	Parameter	Conditions	Ratings	Unit
Vcc ,	Supply voltage		17	V
lcc.	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20 .	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	9

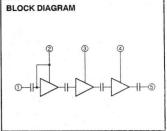
Symbol	Parameter	Test conditions	Limits		1
0,00.	i diametel	Test conditions	Min	Max	Unit
f	Frequency range		360	380	MHz
Po	Output power	Pin = 0.2W	13	A CONTRACTOR	W
ηт	Total efficiency	Vcc = 12.5V Zg = ZL = 50 Ω	35	38.2794.7	%
2fo	2nd. harmonic			- 30	dB
<i>p</i> in	Input VSWR		4 3.2 3.7 3	2.8	-
_	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin: controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50 \Omega$	No degradation		-



M57704UL

380~400MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY ④VCC3: 3rd. DC SUPPLY ⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

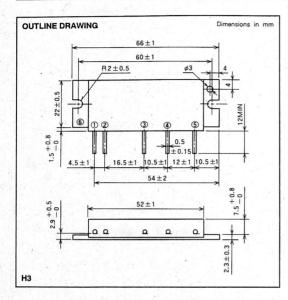
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current	강하다 그리고 있다고 있다면 하는 것이다.	5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		-40~110	℃

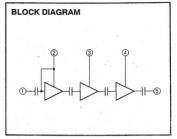
Symbol	Parameter	Test conditions	Limits		1111
Зуппоог	Farameter	rest conditions	Min	Max	Unit
f ,	Frequency range	P _{in} = 0.2W Vcc = 12.5V	380	400	MHz
Po	Output power		13		W
ηт	Total efficiency		35		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
p in	Input VSWR			2.8	
-	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. Zo = 50 Q	No degradation		_



M57704L

400~420MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

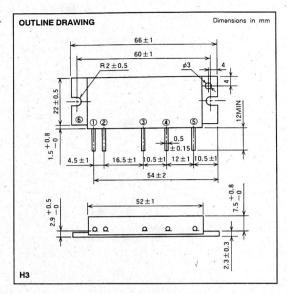
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	· V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	
Tc(op)	Operation case temperature		-30~110	20
Tstg	Storage temperature		- 40~110	°C

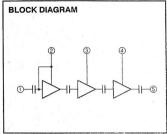
Symbol	Parameter	Test conditions	Limits		1 1000
0,,,,,,,,,	1 di di lictei	rest conditions	Min	Max	Unit
f	Frequency range		400	420	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	13	10000000	W
ηт	Total efficiency		35	Addition	%
2fo	2nd. harmonic		5 114	- 30	dB
P in	Input VSWR			2.8	-
<u>-</u>	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Zg = 50 Q	No degradation		-



M57704M

430~450MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③ VCC2 : 2nd, DC SUPPLY ④ VCC3 : 3rd, DC SUPPLY

6PO : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current	하는 이 사람이 없는 어느는 그 밤 좀 뭐 나요? 점점	5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

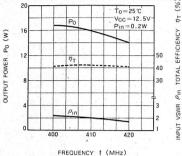
Symbol	Parameter	Test conditions	Limits		11.5
Cyllibol	Farameter	rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	430	450	MHz
Po	Output power		13		W
ηΤ	Total efficiency		35		%
2fo	2nd. harmonic			- 30	dB
p in	Input VSWR-		A STATE OF THE STA	2.8	3 3
-	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin: controlled) Load VSWR=20:1 (AII phase), 2sec. Zg = 50 Ω	No degradation		-



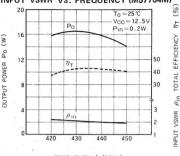
430~450MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704L)

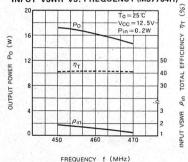


OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704M)

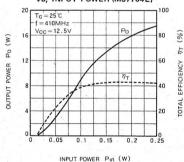


FREQUENCY f (MHz)

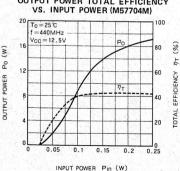
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704H)



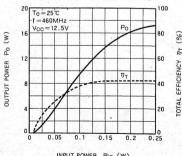
OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER (M57704L)



OUTPUT POWER TOTAL EFFICIENCY



OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER (M57704H)

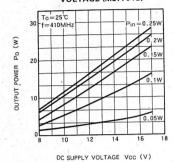


INPUT POWER Pin (W)

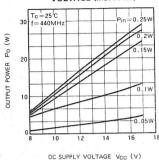


430~450MHz, 12.5V, 13W, FM MOBILE RADIO

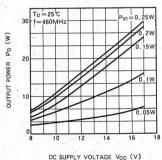
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704L)



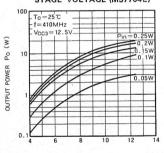
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704M)



OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704H)

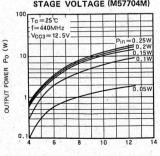


OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704L)



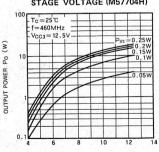
1st AND 2nd STAGE VOLTAGE $V_{CC1} = V_{CC2}$ (V)

OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704M)



1st AND 2nd STAGE VOLTAGE VCC1 = VCC2 (V)

OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704H)



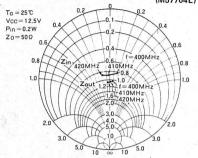
1st AND 2nd STAGE VOLTAGE VCC1 = VCC2 (V)



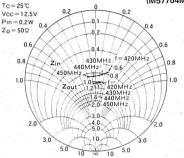
M57704M

430~450MHz, 12.5V, 13W, FM MOBILE RADIO

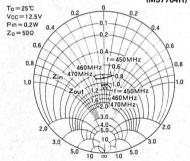
INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704L)



INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704M)



INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704H)



430~450MHz, 12.5V, 13W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 15^{\circ}C/W \text{ (Typ.)}$

b) Second stage transistor

 $R_{th(j-c)2} = 6^{\circ}C/W$ (Typ.)

c) Final stage transistor $R_{th(i-c)3} = 2.5^{\circ} \text{C/W (Typ.)}$

- (2) Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

 P_{O} = 13W, V_{CC} = 12.5V, P_{In} = 0.2W, η_{T} = 35% (minimum rating), P_{O1} (Note 1) = 1.5W, P_{O2} (2) = 6W, I_{T} = 3.0A (I_{T1} (3) = 0.25A, I_{T2} (4) = 0.75A, I_{T3} (5) = 2.0A)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

 $T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(6)}$ = (12.5 \times 0.25 - 1.5 + 0.2) \times 15 + T_{C}

 $= 27 + T_C (^{\circ}C)$

Note 6: Package temperature of device

• Junction temperature of the second stage transistor

$$\begin{split} T_{j2} &= (V_{CC} \times I_{T2} - P_{O2} + P_{O1} \times R_{th(j-c)2} + T_{C} \\ &= (12.5 \times 0.75 - 6 + 1.5) \times 6 + T_{C} \\ &= 29 + T_{C} \ (^{\circ}C) \end{split}$$

• Junction temperature of the final stage transistor

$$\begin{split} T_{J3} &= (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(J-3)} + T_C \\ &= (12.5 \times 2.0 - 13 + 6) \times 2.5 + T_C \\ &= 45 + T_C \ (^{\circ}C) \end{split}$$

2. Heat sink design

In thermal design of heat sink, try to keep to package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ} \text{C}$) and at the output power of 13W below 90°C .

The thermal resistance $R_{th(c-a)}^{(7)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(13/0.35) - 13 + 0.2}$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

 $T_{j1} = 117^{\circ}C$, $T_{j2} = 119^{\circ}C$, $T_{j3} = 135^{\circ}C$ at $T_{j3} = 135^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{C} = 90^{\circ}C$.

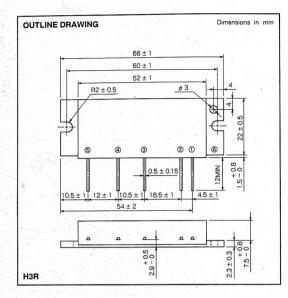
In the annual average of ambinet temperature is 30°C,

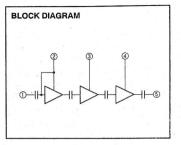
 $T_{i1} = 87^{\circ}C$, $T_{i2} = 89^{\circ}C$, $T_{i3} = 105^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57704MR

430~450MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③VCC2 : 2nd. DC SUPPLY ④VCC3 : 3rd. DC SUPPLY ⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

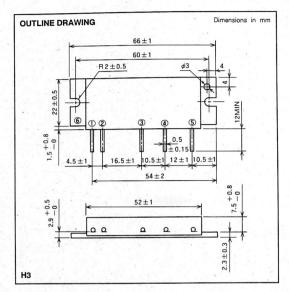
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	*Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	°C

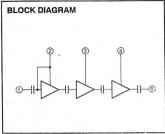
Symbol	Parameter	Test conditions	Limits		
Syllibol	rarameter	rest conditions	Min	Max	Unit
f Frequency range		430	450	MHz	
Po	Output power	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_{G} = Z_{L} = 50 Ω$	13		W
ηт	Total efficiency		35		%
2fo	2nd. harmonic			- 30	dB
ρ in	Input VSWR			2.8	
= -	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_{O} = 14W$ (P_{in} : controlled) Load VSWR=20:1 (AII phase), 2sec. $Z_{C} = 50 \Omega$	No degradation		-



M57704H

450~470MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③ VCC2: 2nd. DC SUPPLY ④ VCC3: 3rd. DC SUPPLY

⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

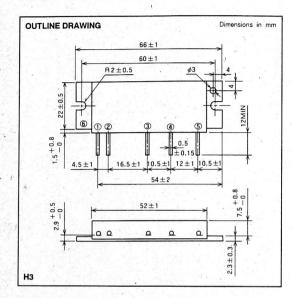
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	2
Tsto	Storage temperature		-40~110	°C

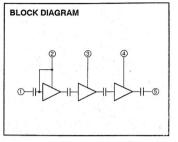
		Test conditions	Limits		11-2
Symbol	Parameter	lest conditions	- Min	Max	Unit
f	Frequency range		450	470	MHz
Po	Output power .	Pin = 0.2W	13		W
ηΤ	Total efficiency	Vcc = 12.5V	35		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.8	100-
-	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_{O} = 14W$ (P_{In} : controlled) Load VSWR=20:1(AII phase), 2sec. $Z_{G} = 50$ Ω	No degradation		_



M57704UH

470~490MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

@ VCC3 : 3rd. DC SUPPLY

⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

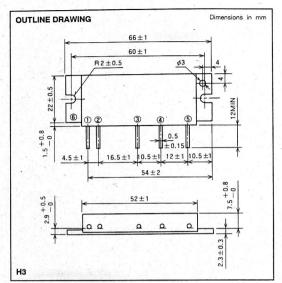
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	·V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature	West to the second state of the second secon	-30~110	90
Tstg	Storage temperature	The second secon	-40~110	90

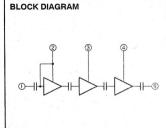
Symbol	Parameter	Test conditions	Limits		
	Graniotor	Test conditions	Min	Max	Unit
f	Frequency range		470	490	MHz
Po	Output power	Pin = 0.2W Vcc = 12.5V	13		W
ητ	Total efficiency		35	30 37 33 48	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
P in	Input VSWR		31.00	2.8	-
_	Load VSWR tolerance	$ \begin{array}{lll} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 14\text{W (Pin: controlled)} \\ \text{Load VSWR-20:1(AII phase), 2sec.} \\ \text{Ze} = 50 \ \Omega \\ \end{array} $	No degradation		-



M57704SH

490~512MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY

③VCC2 : 2nd. DC SUPPLY

6 GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

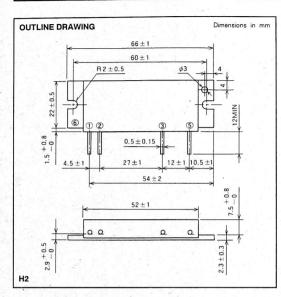
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		- 30~110	°C
Tstg	Storage temperature		- 40~110	°C

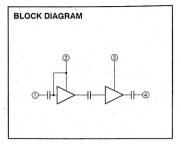
Symbol	Parameter	Test conditions	Limits		11-24
	Farameter	rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	490	512	MHz
Po	Output power		13	The Control	W
ηт	Total efficiency		35		%
2fo	2nd. harmonic			- 30	dB
p in	Input VSWR			2.8	-
-	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 14\mbox{W} (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load VSWR=}20:1 (\mbox{AII phase}), 2\mbox{sec}, \\ \mbox{Zg} = 50\Omega \\ \end{array} $	No degradation		-



M57706L

135~145MHz, 12.5V, 8W, FM MOBILE RADIO





PIN:

PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④PO: RF OUTPUT
⑤GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	. °C
Tstg	Storage temperature		- 40~110	°C

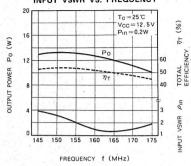
Symbol	Parameter	Test conditions	Limits		198
Cymbol	r araineter	rest conditions	Min	Max.	Unit
f	Frequency range		135	145	MHz
Po	Output power		8		W
η T	Total efficiency	P _{in} = 0.2W Vcc = 12.5V Zg = Z _L = 50 Ω	35	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	%
2fo	2nd. harmonic				dB
3fo	3rd. harmonic	26 - 26 - 50 %		-3	dB
Pin	Input VSWR			4	
-	Load VSWR tolerance	Vcc = 15.2V, Po = 12W (Pin: controlled) Load VSWR-20:1 (All phase), 2sec. Zo = 50Q	No degradation		-



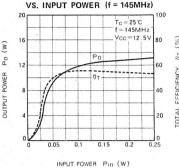
135~145MHz, 12.5V, 8W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA (Typical performance datas of M57706 are shown under, Typical performance datas of M57706L are similar to these of M57706)

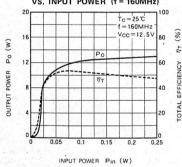
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



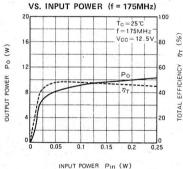
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (f = 145MHz)



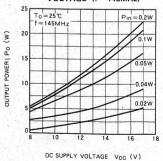
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (f = 160MHz)



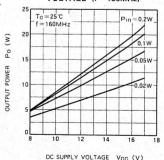
OUTPUT POWER, TOTAL EFFICIENCY,



OUTPUT POWER VS. DC SUPPLY VOLTAGE (f = 145MHz)

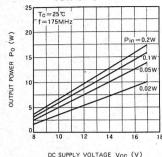


OUTPUT POWER VS. DC SUPPLY VOLTAGE (f = 160MHz)

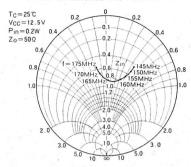




OUTPUT POWER VS. DC SUPPLY VOTAGE (f = 175MHz)



INPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIA-TION.

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(j-c)1} = 10^{\circ} C/W (Typ.)$$

b) Final stage transistor

 $R_{th(j-c)2} = 3^{\circ} C/W (Typ.)$

- (2) Junction temperature of incorporated transistors at standard operation.
 - Conditions for standard operation.

 P_0 = 8W, V_{CC} = 12.5V, P_{in} = 0.2W, η_T = 35% (minimum rating), P_{01} (Note 1) = 1.8W, I_T = 1.9A (I_{T1} (2) = 0.3A, I_{T2} (3) = 1.6A)

Note 1: Output power of the first stage transistor Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor
 T_{j1} = (V_{CC} × I_{T1} - P_{O1} + P_{In}) × R_{th}(j-c)₁ + T_C(4)
 = (12.5 × 0.3 - 1.8 + 0.2) × 10 + T_C

 $= 22 + T_{c} (^{\circ}C)$

Note 4: Package temperature of device

• Junction temperature of the final stage transistor $T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th}(j_{-c})_2 + T_c$ $= (12.5 \times 1.6 - 8 + 1.8) \times 3 + T_c$ $= 42 + T_c (^{\circ}C)$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}$ C) and at the output power of 8W below 90° C.

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

Note 5

$$R_{th(c-a)}^{th(c-a)} = \frac{T_c - T_a}{(P_0/n_T) - P_0 + P_{in}} = \frac{90 - 60}{(8/0.35) - 8 + 0.2}$$

= 2.0 (°C/W)

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

 $T_{j1} = 122^{\circ}C$, $T_{j2} = 142^{\circ}C$ at $T_a = 60^{\circ}C$, $T_C = 90^{\circ}C$. In the annual average of ambient temperature is $30^{\circ}C$.

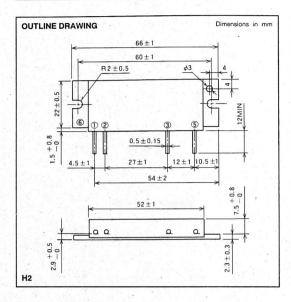
 $T_{i1} = 92^{\circ}C, T_{i2} = 112^{\circ}C$

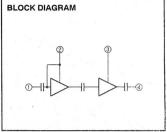
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.



M57706

145~175MHz, 12.5V, 8W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③VCC2 : 2nd. DC SUPPLY ④PO : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
TC(OP)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	°C

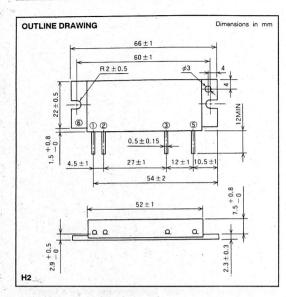
ELECTRICAL CHARACTERISTICS (T_C = 25 ℃ unless otherwise noted)

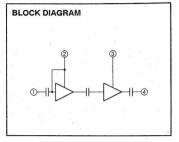
Symbol	Parameter	Test conditions	Limits		11.5
Cyllibol	rarameter	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 0.2W Vcc = 12.5V ZG = ZI = 50.0	145	175	MHz
Po	Output power		8	0.500	W
ηт	Total efficiency		35	No. 10 10 10 10 10 10 10 10 10 10 10 10 10	%
2fo	2nd. harmonic		1 1 2 1 1 1	- 15	dB
3fo	3rd. harmonic	28 - 2L - 50 Ω		- 25	dB
Pin	Input VSWR			4	100
_	Load VSWR tolerance	V _{CC} = 15.2V, Po = 12W (P _{In} : controlled) Load VSWR=20:1 (AII phase), 2sec. Z _G = 50Ω	No degradation		-



M57710-A

156~160MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③VCC2 : 2nd. DC SUPPLY ④PO : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc .	Total current		7	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	%

Symbol Parameter	Porometor	Test conditions	Limits		1100
	Test conditions	Min	Max	Unit	
f	Frequency range	Pin = 0.2W Vcc = 12.5V ZG = ZL = 50 Ω	156	160	MHz
Po	Output power		30	N. 3074	W
ηт	Total efficiency		45	V	%
2fo	2nd. harmonic			- 25	dB
3fo	3rd, harmonic	26 - 26 - 30 \$2		- 30	dB
p in	Input VSWR			2.8	7 174
-	Load VSWR tolerance	Vcc = 15.2V, Po = 35W (Pin: controlled) Load VSWR=20:1 (All phase), 5sec. Zo = 50Q	No degradation		-

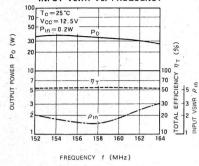


M57710-A

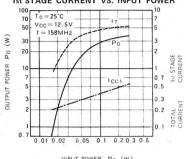
156~160MHz, 12.5V, 30W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY. INPUT VSWR VS. FREQUENCY

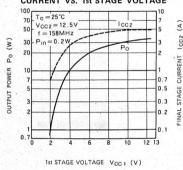


OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER

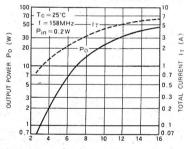


INPUT POWER Po (W)

OUTPUT POWER, FINAL STAGE CURRENT VS. 1st STAGE VOLTAGE



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE 100



DC SUPPLY VOLTAGE VCC (V)

DESIGN CONSIDERATION OF HEAT RADIA-TION.

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 8^{\circ}C/W \text{ (Typ.)}$$

b) Final stage transistor

$$R_{th(i-c)2} = 2^{\circ}C/W (Typ.);$$

- Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

$$P_{\rm O}$$
 = 28W, $V_{\rm CC}$ = 12.5V, $P_{\rm in}$ = 0.2W, $\eta_{\rm T}$ = 45% (minimum rating), $P_{\rm O1}$ (Note 1) = 5W, $I_{\rm T}$ = 5.0A ($I_{\rm T1}$ (2) = 0.9A, $I_{\rm T2}$ (3) = 4.1A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Note 4: Package temperature of device

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}\text{C}$) and at the output power of 8W below 90°C .

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{\text{th (c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(28/0.45) - 28 + 0.2}$$
$$= 0.87 \, {}^{(2)}_{\text{CAM}}$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

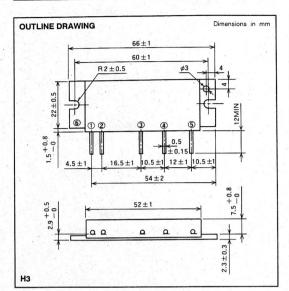
$$T_{j1} = 142^{\circ}C$$
, $T_{j2} = 147^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{c} = 90^{\circ}C$.

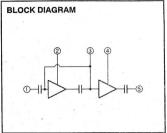
In the annual average of ambient temperature is
$$30^{\circ}$$
C,
 $T_{j1} = 112^{\circ}$ C, $T_{j2} = 117^{\circ}$ C

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.

M57713

144~148MHz, 12.5V, 17W, MOBILE SSB RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③V6B : BASE BIAS

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

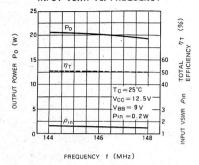
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
VBB	Base bias		10	V
lcc	Total current		6	Α
Tc(op)	Operation case temperature		-30~110	~
Tstg	Storage temperature		-40~110	°C

Symbol	0	Test conditions	Lin	Limits	
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V V _{BB} = 9V	17		W
ηт	Total efficiency		40 -		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
· p in	Input VSWR			2.2	-
_	Load VSWR tolerance	$ \begin{array}{ll} \mbox{Vcc} = 15.2\mbox{V}, \mbox{VBB} = 9\mbox{V} \\ \mbox{Po} = 14\mbox{W} \mbox{ (Pin: controlled)} \\ \mbox{Load VSWR-20:1 (All phase)} \\ \mbox{Zg} = 50 \ \Omega \\ \end{array} $	No degradation		-

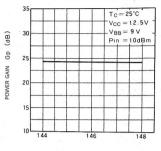


TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY

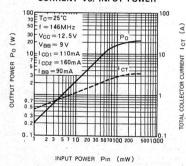


POWER GAIN VS. FREQUENCY

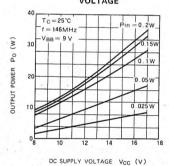


FREQUENCY f (MHz)

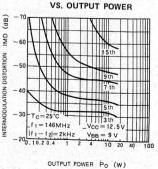
OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER



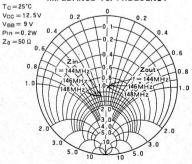
OUTPUT POWER VS. SUPPLY



INTERMODULATION DISTORTION



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY





144~148MHz, 12.5V, 17W, MOBILE SSB RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(j-c)1} = 10^{\circ} C/W (Typ.)$$

b) Final stage transistor

$$R_{th(j-c)2} = 2^{\circ}C/W$$
 (Typ.)

- (2) Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

 P_0 = 14W, V_{CC} = 12.5V, P_{In} = 0.07W, η_T = 40% (minimum rating), P_{01} (Note 1) = 2.5W, I_T = 2.8A (I_{T1} (2) = 0.5A, I_{T2} (3) = 2.3A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Note 4: Package temperature of device

· Junction temperature of the final stage transistor

$$\begin{split} T_{j2} &= (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th}(j_{-c})_2 + T_c \\ &= (12.5 \times 2.3 - 14 + 2.5) \times 2 + T_c \\ &= 35 + T_c \ (^{\circ}C) \end{split}$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^{\circ}\text{C}$) and at the output power of 14W below 90°C

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{\text{th (c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(14/0.4) - 14 + 0.07}$$
$$= 1.42 \, (^{\circ}\text{C/W})$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

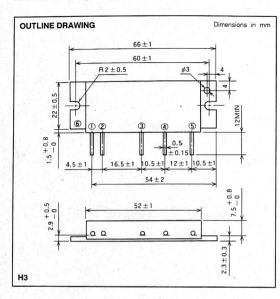
$$T_{j1} = 129^{\circ}C$$
, $T_{j2} = 125^{\circ}C$ at $T_a = 60^{\circ}C$, $T_c = 90^{\circ}C$.
In the annual average of ambient temperature is $30^{\circ}C$,

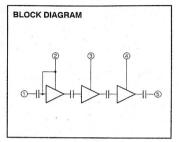
$$T_{i1} = 99^{\circ}C, T_{i2} = 95^{\circ}C$$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57714EL

335~360MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

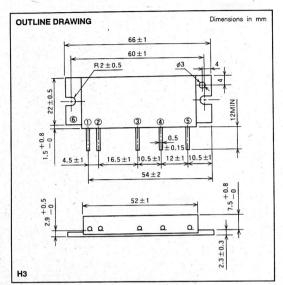
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

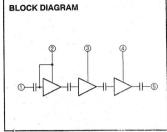
Symbol	Parameter	Test conditions	Limits		
	프로 학교의 제공 기업 이 및 기업으로 있다.	rest conditions	Min	Max	Unit
f	Frequency range		335	360	MHz
Po	Output power	Pin = 0.1 W Vcc = 12.5 V Zc = ZL = 50 Ω	7	100	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic			- 30	dB
Ø in	Input VSWR			2	_ UB
	Load VSWR tolerance	Vcc = 15.2V, Po = 7W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. $Z_G = 50 \Omega$	No degradation		-



M57714SL

360~380MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:
①Pin::RF INPUT
②VCC1::1st. DC SUPPLY
③VCC2::2nd. DC SUPPLY
④VCC3::3rd. DC SUPPLY
⑤PO::RF OUTPUT
⑥GND::FIN

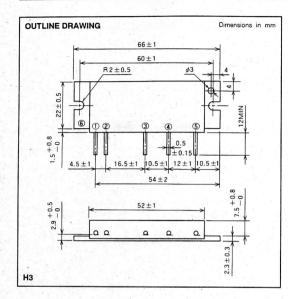
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

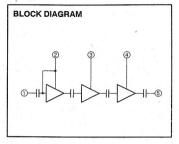
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

		T	Limits		Unit
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		360	380	MHz
Po	Output power	Pin = 0.1W Vcc = 12.5V	7	a 8/2 (15/5 b 6	W
ηΤ	Total efficiency		38		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2	- St C
_	Load VSWR tolerance	$\label{eq:vc} \begin{array}{ll} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 7\text{W} \text{ (Pin: controlled)} \\ \text{Load VSWR=20:1 (AII phase), 2sec.} \\ \text{Zo} = 50 \ \Omega \end{array}$	No degradation		-

M57714UL

380~400MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin ; RF INPUT @VCC1: 1st. DC SUPPLY

③VCC2: 2nd, DC SUPPLY

@ VCC3 : 3rd. DC SUPPLY ⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

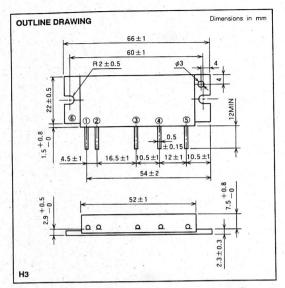
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		4	Δ
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

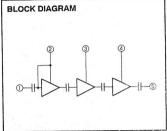
Symbol	Parameter	Test conditions	Limits		100
		Test conditions	Min	Max	Unit
f	Frequency range		380	400	MHz
Po	Output power	Pin = 0.1W Vcc = 12.5V Zc = ZL = 50 Ω	7	1000	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic		100000000000000000000000000000000000000	- 30	dB
ρ in	Input VSWR			2	UB -
-	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 7\mbox{W} \; (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load} \; \mbox{VSWR=20:1} \; (\mbox{AII} \; \mbox{phase}), \mbox{2sec}, \\ \mbox{Zg} = 50 \; \Omega \\ \end{array} $	No degradation		-



M57714L

400~420MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:
①Pin:RF INPUT
②VCC1:1st.DC SUPPLY
③VCC2:2nd.DC SUPPLY
④VCC3:3rd.DC SUPPLY
⑤PO:RF OUTPUT
⑥GND:FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

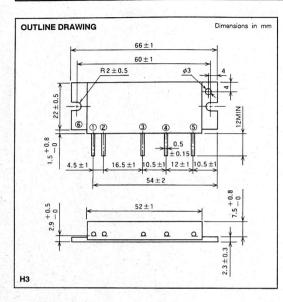
Symbol Parameter		Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	℃
Tsto	Storage temperature		-40~110	℃

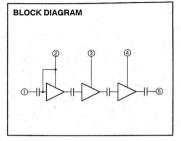
			Limits		Unit
Symbol	Parameter .	Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.1W Vcc = 12.5V	400	420	MHz
Po	Output power		7		W
ηт	Total efficiency		38	M. Shakara	%
2fo	2nd, harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2	
-	Load VSWR tolerance	$\label{eq:vc} \begin{array}{ll} \mbox{Vcc} = 15.2\mbox{V,} \\ \mbox{Po} = 7\mbox{W} \; (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load VSWR-20:1 (AII phase), 2sec.} \\ \mbox{Ze} = 50 \; \Omega \end{array}$	No degradation		_



M57714M

430~450MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY **④** VCC3 : 3rd. DC SUPPLY ⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

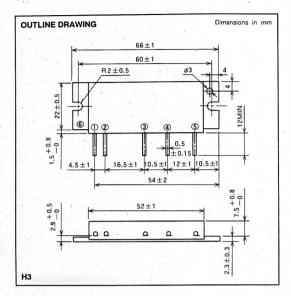
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	' A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	Zg = ZL = 50 Ω	12	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	20

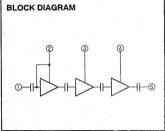
Symbol	Parameter	Test conditions	Limits		7 3 3
Cymbol	r arameter	lest conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	Pin = 0.1W	7	The state of	W
ηт	Total efficiency	Vcc = 12.5V	38	5 1 1 2 1 P	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Ø in	Input VSWR		A CONTRACTOR	2	-
	Load VSWR tolerance	Vcc = 15.2V, Po = 7W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Ze = 50Ω	No degradation		



M57714

450~470MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY

③VCC2: 2nd. DC SUPPLY

Vcc3 : 3rd. DC SUPPLY
 Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		- 30~110	°C
Tstg	Storage temperature		-40~110	°C

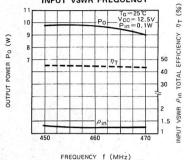
Symbol	Parameter	Test conditions	Limits		11-24
Syllibol		rest conditions	Min	Max	Unit
f .	Frequency range	P _{in} = 0.1 W Vcc = 12.5V Zc = Z _L = 50 Ω	450	470	MHz
Po	Output power		7	No. 1 Wall	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic			- 30	dB
P in	Input VSWR		No. of the second	2	2 -
-	Load VSWR tolerance	$\begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 7\mbox{W} \ (\mbox{Pi}_{in}: \mbox{controlled}) \\ \mbox{Load} \ \mbox{VSWR} = 20:1 \mbox{(AII phase)}, 2 \mbox{sec}. \\ \mbox{Zg} = 50 \ \Omega \end{array}$	No degradation		, -



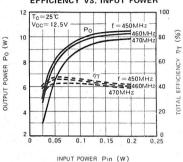
450~470MHz, 12.5V, 7W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

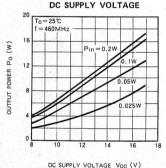
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR FREQUENCY



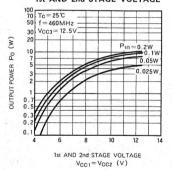
OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER



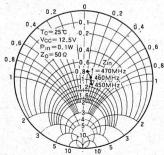
OUTPUT POWER VS.



OUTPUT POWER
1st AND 2nd STAGE VOLTAGE



INPUT IMPEDANCE VS. FREQUENCY





DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat shink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 20^{\circ} C/W \text{ (Type)}$

b) Second stage transistor

 $R_{th(i-c)2} = 10^{\circ} C/W (Type)$

c) Final stage transistor

$$R_{th(i-c)3} = 5^{\circ}C/W$$
 (Typ.)

- (2) Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

 P_0 = 7W, V_{CC} = 12.5V, P_{in} = 0.1W, η_T = 38% (minimum rating), P_{01} (Note 1) = 0.8W, P_{02} (2) = 3.2W, I_T = 1.47A (I_{T1} (3) = 0.12A, I_{T2} (4) = 0.42A, I_{T3} (5) = 0.93A)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c^{(6)}$$

= (12.5 × 0.12 – 0.8 + 0.1) × 20 + T_C

 $= 16 + T_{c} (^{\circ}C)$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_{C}$$

= (12.5 x 0.42 - 3.2 + 0.8) x 10 + T_C

= 29 + Tc (°C)

Junction temperature of the final stage transistor

$$T_{j3} = (V_{cc} \times I_{T3} - P_0 + P_{o2}) R_{th(j-c)3} + T_c$$

= (12.5 x 0.93 - 7 + 3.2) x 5 + T_c

 $= 39 + T_{C} (^{\circ}C)$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}\text{C}$) and at the output power of 7W below 90°C.

The thermal resistance R_{th(c-a)}⁽⁷⁾ of the heat sink to real-

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{in}} = \frac{90 - 60}{(7/0.38) - 7 + 0.1}$$
$$= 2.6 (^{\circ}C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

$$T_{j1} = 106^{\circ}C$$
, $T_{j2} = 119^{\circ}C$, $T_{j3} = 129^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{c} = 90^{\circ}C$.

In the annual average of ambient temperature is 30°C,

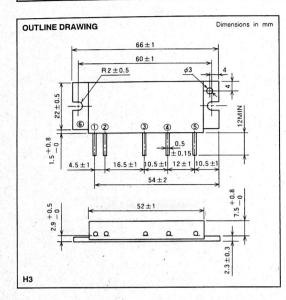
 $T_{i1} = 76^{\circ}C$, $T_{i2} = 89^{\circ}C$, $T_{i3} = 99^{\circ}C$.

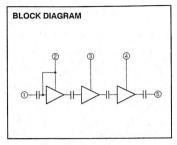
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



M57714UH

470~490MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY

⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

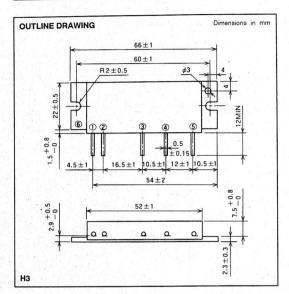
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	00
Tstg	Storage temperature		- 40~110	℃

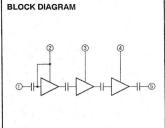
Symbol	Parameter	-	Limits		11.5
Symbol		Test conditions	Min	Max	Unit
f	Frequency range		470	490	MHz
Po	Output power	P _{In} = 0.1W Vcc = 12.5 VZ _G = Z _L = 50 Ω	7		W
ηт	Total efficiency		. 38	374-1-1-1	%
2fo	2nd. harmonic			- 30	dB
P in	Input VSWR		. 200	2	
<u>-</u>	Load VSWR tolerance	V_{CC} = 15.2V, P_0 = 7W (P_{in} : controlled) Load VSWR=20:1 (AII phase), 2sec. Z_G = 50 Ω	No degradation		-



M57714SH

490~512MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin::RF INPUT
②VCC1:1st.DC SUPPLY
③VCC2:2nd.DC SUPPLY
④VCC3:3rd.DC SUPPLY
⑤PO::RF OUTPUT
⑥GND:FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

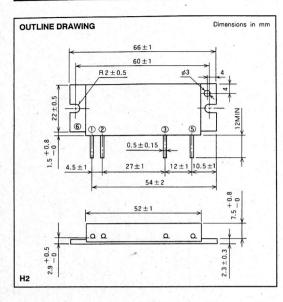
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(OP)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	°C

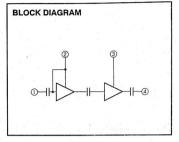
Symbol	Parameter	Test conditions	Limits		11-24
Symbol		lest conditions	Min	Max	Unit
f	Frequency range		490	512	MHz
Po	Output power	Pin = 0.1W Vcc = 12.5V	7	no a more and a	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic	Z _G = Z _L = 50 Ω	12-12-13	- 30	dB
Pin '	Input VSWR		PACTOR OF	2	-
- ,	Load VSWR tolerance	$\label{eq:VCC} \begin{array}{l} V_{CC} = 15.2V, \\ P_{O} = 7W \; (P_{in}: controlled) \\ Load \; VSWR=20: 1 (AII \; phase), 2sec. \\ Z_{G} = 50 \; \Omega \end{array}$	No degradation		-



M57715

144~148MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT ②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY ④PO: RF OUTPUT ⑤GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

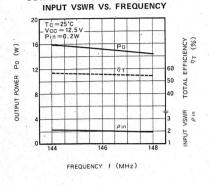
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	The state of the s	17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	℃

Symbol	Parameter	T., (4)	Limits		717
		Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Q	144	148	MHz
Po	Output power		13	ALKEN, C	W
ηт	Total efficiency		48	Service Service	%
2fo	2nd. harmonic		The second	- 25	dB
3fo	3rd. harmonic	25 - 21 - 50 %		- 30	dB
Pin	Input VSWR			2.8	10 Jan.
-	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Ze = 50Q	No degradation		-

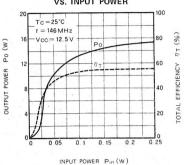


144~148MHz, 12.5V, 13W, FM MOBILE RADIO

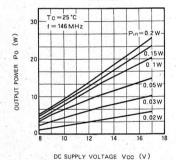
TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY,



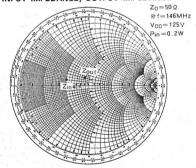
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER



OUTPUT POWER VS. DC SUPPLY VOLTAGE



INPUT IMPEDANCE, OUTPUT IMPEDANCE



DESIGN CONSIDERATION OF HEAT RADIA-TION.

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(j-c)1} = 10^{\circ} \text{ C/W (Typ.)}$$

b) Final stage transistor

 $R_{th(i-c)2} = 3^{\circ}C/W$ (Typ.)

- (2) Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

Po = 13W, V_{CC} = 12.5V, P_{in} = 0.2W, $\eta_{\rm T}$ = 48% (minimum rating), P₀₁ (Note 1) = 2.5W, I_T = 2.2A (I_{T1} (2) = 0.45A, I_{T2} (3) = 1.75A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

• Junction temperature of the first stage transistor $T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th} (j_{-C})_1 + T_C^{(4)}$ $= (12.5 \times 0.45 - 2.5 + 0.2) \times 10 + T_C$

 $= 33 + T_{c} (^{\circ}C)$

Note 4: Package temperature of device

Junction temperature of the final stage transistor
 T_{j2} = (V_{CC} x |_{T2} - P_O + P_{O1}) x R_{th(j-c)2} + T_C
 = (12.5 x 1.15 - 13 + 2.5) x 3 + T_C
 = 34 + T_C (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ} \text{C}$) and at the output power of 8W below 90°C .

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{in}} = \frac{90 - 60}{(13/0.48) - 13 + 0.2}$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

 T_{j1} = 113°C, T_{j2} = 134°C at T_a = 60°C, T_c = 90°C. In the annual average of ambient temperature is 33°C,

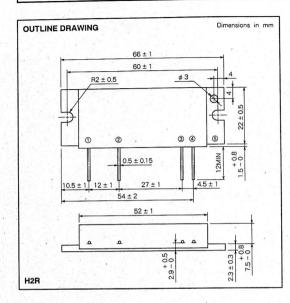
 $T_{j1} = 103^{\circ}C$, $T_{j2} = 104^{\circ}C$

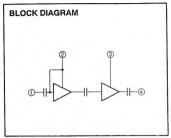
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.



M57715R

144~148MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

@Po : RF OUTPUT

GGND : FIN

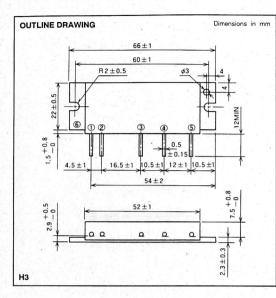
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

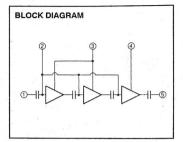
Symbol	. Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	°C

Symbol Parameter		Test conditions	Limits		Unit
	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	13		W
ηт	Total efficiency		48	Y., 15 (1), 15	%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	20 - 21 - 30 %		- 30	dB
p in	Input VSWR		A 1 3 8	2.8	
-	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_{O} = 14W$ (P_{In} : controlled) Load VSWR=20:1 (AII phase), 2sec. $Z_{G} = 50Ω$	No degradation		=

M57716

430~450MHz, 12.5V, 17W, SSB MOBILE RADIO





PIN:

① Pin : RF INPUT ② VBB : BASE BIAS ③ VCC1 : 1st. DC SUPPLY ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

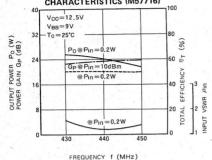
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Vвв	Supply voltage		10	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.3	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	28	W
Tc(op)	Operation case temperature		-30~110	~ ℃
Tstg	Storage temperature		-40~110	°C

Symbol	Parameter	Test conditions	. Lir	Limits	
	1 arameter	rest conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	Pin = 0.2W	17	4.	W
ηт	Total efficiency	Vcc = 12.5V Vss = 9V	35	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	%
2fo	2nd. harmonic	Z _G = Z _L = 50 Ω		- 30	dB
<i>p</i> in	Input VSWR	20 20 00 %	- CORTON	2.5	-
-	Load VSWR tolerance	Vcc = 15.2V, VBB = 9V Po = 14W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Za = 50 Ω	No degradation		-

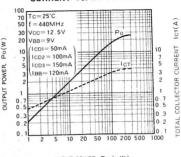


TYPICAL PERFORMANCE DATA

OUTPUT POWER, POWER GAIN, TOTAL EFFICIENCY, INPUT VSWR-FREQUENCY CHARACTERISTICS (M57716)

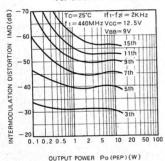


OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER

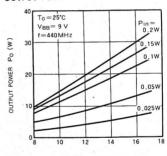


INPUT POWER Pin(mW)

INTERMODULATION DISTORTION VS. OUTPUT POWER

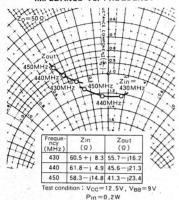


OUTPUT POWER VS. DC SUPPLY VOLTAGE



DC SUPPLY VOLTAGE VCC (V)

INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FRÉQUENCY



DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat shink.

1. Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 15^{\circ}C/W \text{ (Typ.)}$

b) Second stage transistor

 $R_{th(i-c)2} = 6^{\circ}C/W(Typ.)$

c) Final stage transistor

 $R_{th(i-c)3} = 2^{\circ}C/W$ (Typ.)

- (2) Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

 P_0 = 14W, V_{CC} = 12.5V, P_{in} = 80mW, η_T = 35% (minimum rating), P_{01} (Note 1) = 1W, P_{02} (2) = 4.5W, I_T = 3.2A $(I_{T1}^{(3)} = 0.15A, I_{T2(4)} = 0.55A, I_{T3}^{(5)} = 2.5A)$

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor $T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_{c}(6)$ $= (12.5 \times 0.15 - 1 + 0.08) \times 15 + T_{C}$ $= 14.4 + T_C (^{\circ}C)$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

 $T_{i2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1} 1) \times R_{th(j-c)2} + T_{c}$ $= (12.5 \times 0.55 - 4.5 + 1) \times 6 + T_{C}$

 $= 20.3 + T_{c} (^{\circ}C)$

 Junction temperature of the final stage transistor. $T_{j3} = (V_{CC} \times I_{T3} - P_0 + P_{02}) \times R_{th(j-c)3} + T_C$

 $= (12.5 \times 2.5 - 14 + 4.5) \times 2 + T_{C}$

 $= 43.5 + T_{C} (^{\circ}C)$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally Ta = 60°C) and at the output power of 14W below 90°C.

The thermal resistance Rth(c-a) (7) of the heat sink to realize this:

Note 7:
$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{in}} = \frac{90 - 60}{(14/0.35) - 14 + 0.08}$$

= 1.15 (°C/W)

Note 7: Inclusive of the contact thermal resistance between device and heat sink.

Mounting the heat sink of the above thermal resistance on the device.

 $T_{i1} = 104.4$ °C, $T_{i2} = 110.3$ °C, $T_{i3} = 133.5$ °C at $T_{a} =$ 60° C, $T_{c} = 90^{\circ}$ C.

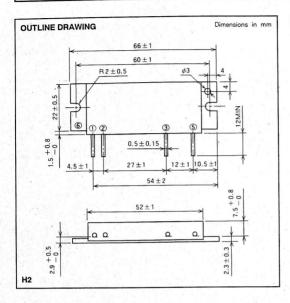
In the annual average of ambient temperature is 30°C, $T_{i1} = 74.4$ °C, $T_{i2} = 80.3$ °C, $T_{i3} = 103.5$ °C.

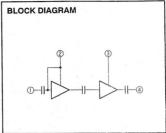
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



M57719L

135~145MHz, 12.5V, 14W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY

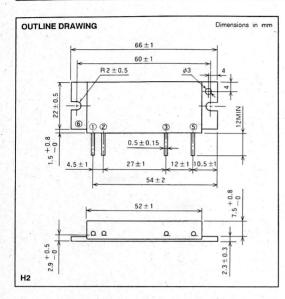
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

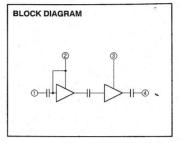
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	경영사 : [18] : [18	17	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	℃

Symbol	Dawweter	Test conditions	Limits		Unit
Symbol	Parameter		Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	135	145	MHz
Po	Output power		14		W
ηT	Total efficiency		40		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	20-21-00%		- 35	dB
P in	Input VSWR			4	
-	Load VSWR tolerance	$\label{eq:Vcc} \begin{array}{l} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 14\text{W} \text{ (Pin: controlled)} \\ \text{Load VSWR} = 20:1 \text{ (AII phase), 2sec.} \\ \text{Zg} = 50\Omega \end{array}$	No degradation		-

M57719N

142~163MHz, 12.5V, 14W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③VCC2: 2nd. DC SUPPLY ④Po : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

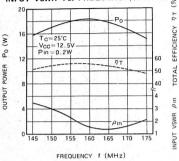
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	. W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	%

Symbol Par	Parameter	Test conditions	Lir		
	1 arameter	rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	142	163	MHz
Po	Output power		14	The Thinks	W
ηт	Total efficiency		40	130 1 18 H	%
2fo	2nd. harmonic		A. S. S. S.	- 25	dB
3fo	3rd. harmonic	26 - 21 - 30 %		- 35	dB
p in	Input VSWR		ALUE -	4	-
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC} = 15.2V, \\ Po = 14W \; (P_{in}: controlled) \\ Load \; VSWR=20:1 \; (AII \;\; phase), 2sec. \\ Z_G = 50\Omega \end{array} $	No degradation		_

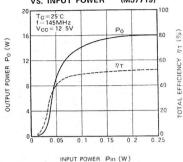


TYPICAL PERFORMANCE DATA

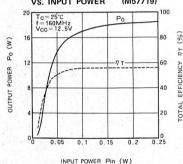
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57719)



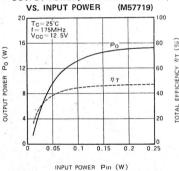
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719)



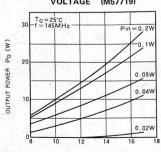
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719)



OUTPUT POWER, TOTAL EFFICIENCY,

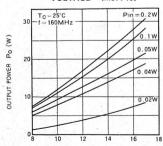


OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



DC SUPPLY VOLTAGE VCC (V)

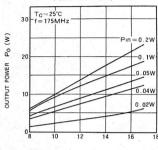
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



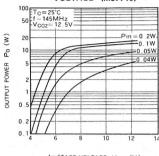
DC SUPPLY VOLTAGE VCC (V)

142~163MHz, 12.5V, 14W, FM MOBILE RADIO

OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



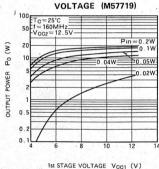
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719)



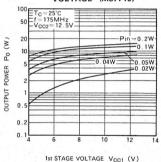
1st STAGE VOLTAGE VCC1 (V)

OUTPUT POWER VS. 1st STAGE

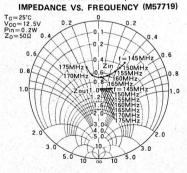
DC SUPPLY VOLTAGE VCC (V)



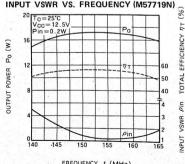
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719)



OUTPUT IMPEDANCE, INPUT



OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57719N)



EFFICIENCY

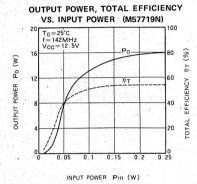
TOTAL

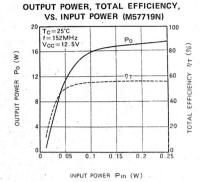
pin VSWR INPUT

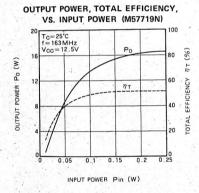
FREQUENCY f (MHz)

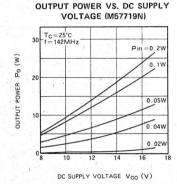


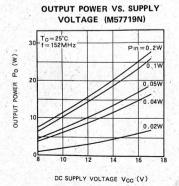
142~163MHz, 12.5V, 14W, FM MOBILE RADIO

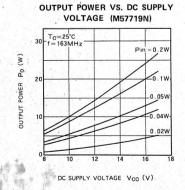






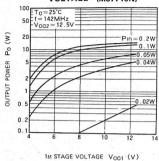




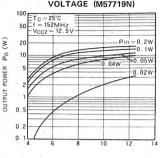


142~163MHz, 12.5V, 14W, FM MOBILE RADIO

OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)

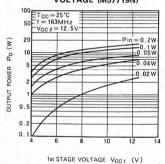


OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)

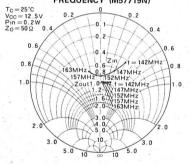


1st STAGE VOLTAGE VCC1 (V)

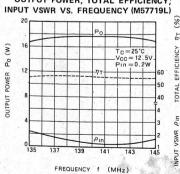
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)



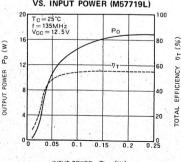
OUTPUT IMPEDANCE, INPUT IMPEDANCE VS. FREQUENCY (M57719N)



OUTPUT POWER, TOTAL EFFICIENCY: INPUT VSWR VS. FREQUENCY (M57719L)



OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M577191)



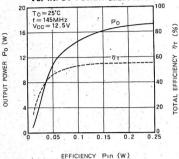
INPUT POWER Pin (W)



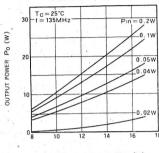
M57719N

142~163MHz, 12.5V, 14W, FM MOBILE RADIO

OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719L)

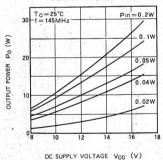


OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719L)

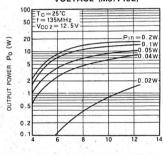


DC SUPPLY VOLTAGE VCC (V)

OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719L)

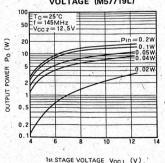


OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719L)

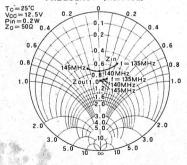


1st STAGE VOLTAGE VCC 1 (V)

OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719L)



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY (M57719L)





DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 10^{\circ} C/W (Typ.)$$

b) Final stage transistor

$$R_{th(j-c)2} = 3^{\circ}C/W \text{ (Typ.)}$$

- (2) Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

$$P_0$$
 = 14W, V_{CC} = 12.5V, P_{in} = 0.2W, η_T = 40% (minimum rating), P_{01} (Note 1) = 2.5W, I_T = 2.8A (I_{T1} (2) = 0.5A, I_{T2} (3) = 2.3A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor.
 T_{j1} = (V_{CC} x I_{T1} - P_{O1} + P_{in}) x R_{th(j-c)1} + T_c⁽⁴⁾

=
$$(12.5 \times 0.5 - 2.5 + 0.2) \times 10 + T_C$$

= $39.5 + T_C$ (°C)

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$\begin{split} T_{j2} &= (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c \\ &= (12.5 \times 2.3 - 14 + 2.5) \times 3 + T_c \\ &= 51.8 + T_c \, (^{\circ}C) \end{split}$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^{\circ}C$) and at the output power of 14W below $90^{\circ}C$.

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{in}} = \frac{90 - 60}{(14/0.40) - 14 + 0.2}$$
$$= 1.9 (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

 $T_{j1} = 140^{\circ}$ C, $T_{j2} = 152^{\circ}$ C at $T_a = 60^{\circ}$ C, $T_c = 90^{\circ}$ C. In the annual average of ambient temperature is 30° C,

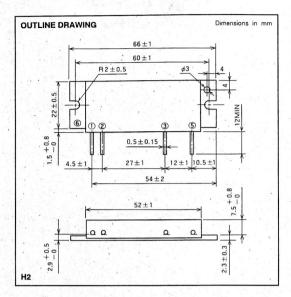
$$T_{j1} = 110^{\circ}C, T_{j2} = 122^{\circ}C$$

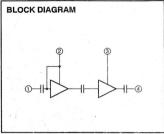
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175° C, application under fully derated condition is ensured.



M57719

145~175MHz, 12.5V, 14W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②Vcc1 : 1st. DC SUPPLY ③Vcc2 : 2nd. DC SUPPLY ④PO : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

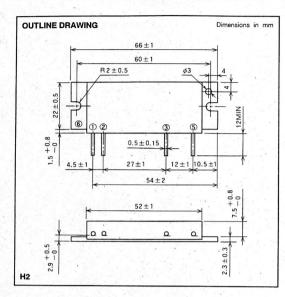
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		-40~110	20

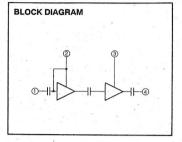
Symbol	Parameter	Test conditions	Limits		11.75
Oymboi	rararrieter	rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.2W Vcc = 12.5V Z ₀ = Z _L = 50 Ω	145	175	MHz
Po	Output power		14	S	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic		the new contract	- 25	dB
3fo	3rd, harmonic	ZG = ZL = 30 Ω	2000000	- 35	dB
ρin ,	Input VSWR		Sept 1 - Treat	4	-
-	Load VSWR tolerance	$\label{eq:Vcc} \begin{array}{l} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 14\text{W} \text{ (Pin: controlled)} \\ \text{Load VSWR=20:1 (AII phase), 2sec.} \\ \text{Zg} = 50\Omega \end{array}$	No degradation		-



M57726

144~148MHz, 12.5V, 43W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY ④ PO : RF OUTPUT ⑤ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25°C unless otherwise noted)

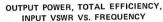
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc .	Total current		14	Δ
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	55	١٨/
Tc(op)	Operation case temperature	Salar Sa	- 30~110	90
Tstg	Storage temperature		-40~110	90

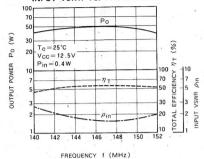
Symbol Parameter	Parameter	Parameter Test conditions	Limits		
	rest conditions	Min	Max	Unit	
f	Frequency range		144	148	MHz
Po	Output power	Pin = 0.3W Vcc = 12.5V	43	AU A BASS	W
ηт	Total efficiency		50		%
2fo	2nd. harmonic		- 00	- 35	
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$			dB
Pin	Input VSWR			- 45	dB
-	mpac 101111		(A) (A) (A)	2.8	-
-	Load VSWR tolerance	Vcc = 15.2V, Po = 45W (Pin : controlled) Load VSWR=20:1 (All phase), 5sec. Z _G = 50Ω	No degradation		_



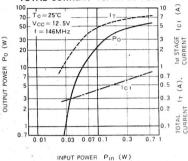
144~148MHz, 12.5V, 43W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

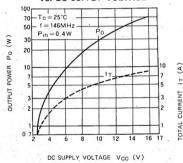




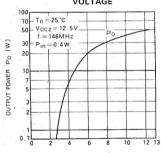
OUTPUT POWER, 1st STAGE CURRENT TOTAL CURRENT VS. INPUT POWER



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE



OUTPUT POWER VS. 1st STAGE VOLTAGE



1st STAGE VOLTAGE VCC1 (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(i-c)1} = 4.3^{\circ}C/W \text{ (Typ.)}$

b) Final stage transistor

 $R_{th(i-c)2} = 1.5^{\circ}C/W (Typ.)$

- (2) Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

 P_0 = 43W, V_{CC} = 12.5V, P_{in} = 0.4W, η_T = 50% (minimum rating), P_{01} (Note 1) = 9.4W, I_T = 6.88A (I_{T1} (2) = 1.25A, I_{T2} (3) = 5.63A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Unution temperature of the first stage transistor
$$T_{j1} = (V_{CC} \times I_{T1} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_c^{(4)}$$

= $(12.5 \times 1.25 - 9.4 + 0.4) \times 4.3 + T_c$
= $28.5 + T_c$ (°C)

Note 4: Package temperature of device

• Junction temperature of the final stage transistor $T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}1) \times R_{th}(j_{-c})_2 + T_C$

$$= (12.5 \times 5.63 - 63 + 9.4) \times 1.5 + T_{c}$$

$$= 55.2 + T_{c} (^{\circ}C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a=60^{\circ}\text{C}$) and at the output power of 43W below 90°C .

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{in}} = \frac{90 - 60}{(43/0.5) - 43 + 0.4}$$
$$= 0.69 \ (^{\circ}C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

 T_{j1} = 118.5°C, T_{j2} = 145.2°C at T_a = 60°C, T_c = 90°C. In the annual average of ambient temperature is 30°C,

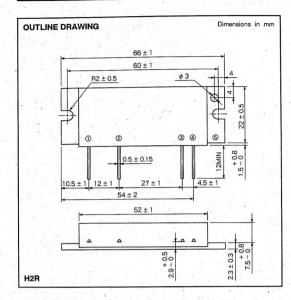
 $T_{j1} = 88.5^{\circ}C, T_{j2} = 115.2^{\circ}C$

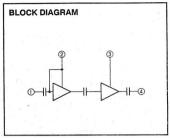
As the maximum junction temperature of these incorporated transistors $T_{j_{max}}$ are 175°C, application under fully derated condition is ensured.



M57726R

144~148MHz, 12.5V, 43W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ PO: RF OUTPUT
⑤ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

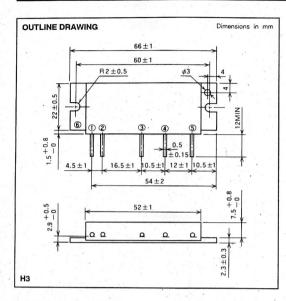
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		14	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	55	W
Tc(OP)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	℃

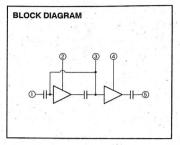
Symbol	Parameter	Test conditions	Limits		Unit
Symbol	Parameter	rest conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	Pin = 0.3W Vcc = 12.5V	43		W
ηт	Total efficiency		50		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	A. A. A.	- 35	dB
3fo .	3rd. harmonic	25 2L - 50 %		- 45	dB
P in	Input VSWR		9.0	2.8	12
-	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 45\mbox{W} \ (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load VSWR=}20:1 \ (\mbox{AII phase}), 5 \mbox{sec}, \\ \mbox{Zg} = 50\mbox{\Omega} \\ \end{array} $	No degradation		-



M57727

144~148MHz, 12.5V, 37W, SSB MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③VBB : BASE BIAS ④VCC2 : 2nd. DC SUPPLY ⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = $25\,^{\circ}\text{C}$ unless otherwise noted)

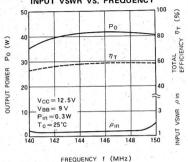
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Vвв	Base bias		10	V
Icc	Total current		10	Δ
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	w
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		- 30~110	%
Tstg	Storage temperature	We have a second of the second	-40~110	90

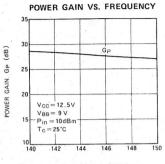
Symbol	Parameter	Test conditions	Limits		
Park	- Glanicia	Test conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	P _{in} = 0.3W Vcc = 12.5V V _{BB} = 9V	37	1 1 1 1 1 1 1 1 1 1	W
ηт	Total efficiency		50		%
2fo	2nd. harmonic		- 00,	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	
Ø in	Input VSWR		-	2.2	dB
_	Load VSWR tolerance	Vcc = 15.2V, Vsb = 9V Po = 30W (Pin: controlled) Load VSWR≥20:1(AII phase), 5sec. Z _G = 50 Ω	No degradation		



TYPICAL PERFORMANCE DATA

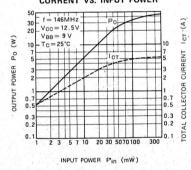
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



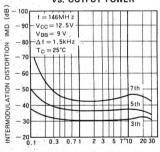


FREQUENCY f (MHz)

OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER



INTERMODULATION DISTORTION VS. OUTPUT POWER



OUTPUT POWER PO(PEP) (W)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 3^{\circ}C/W$$
 (Typ.)

b) Final stage transistor

 $R_{th(i-c)2} = 1.5^{\circ}C/W \text{ (Typ.)}$

- (2) Junction temperature of incorporated transistors at standard operation.
 - · Conditions for standard operation.

 P_0 = 30W, V_{CC} = 12.5V, P_1 n = 0.1W, η_T = 50% (minimum rating), P_{01} (Note 1) = 2W, I_T = 4.8A (I_{T1} (2) = 0.4A, I_{T2} (3) = 4.4A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th(j-c)2} + T_c$$

= (12.5 x 4.4 - 30 + 2) x 1.5 + T_c
= 40.5 + T_c (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^{\circ}$ C) and at the output power of 30W below 90° C.

The thermal resistance R_{th(c-a)}⁽⁵⁾ of the heat sink to realize this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(30/0.5) - 30 + 0.1}$$
$$= 1.00 \, (^{\circ}_{\text{C/W}})$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

 $T_{j1} = 110^{\circ}$ C, $T_{j2} = 131^{\circ}$ C at $T_{a} = 60^{\circ}$ C, $T_{c} = 90^{\circ}$ C. In the annual average of ambient temperature is 30° C,

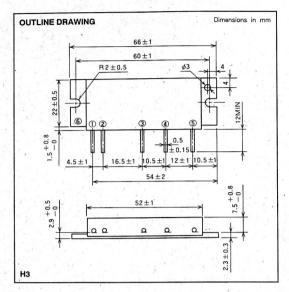
 $T_{j1} = 70^{\circ}C, T_{j2} = 101^{\circ}C$

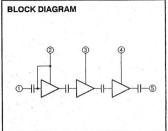
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175° C, application under fully derated condition is ensured.



M57729EL

335~360MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY ④ VCC3: 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

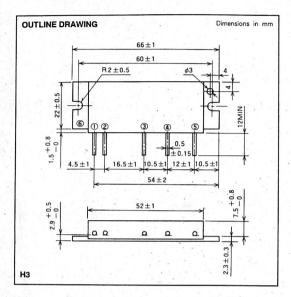
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc -	Total current		10	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		-30~110	°C
T _{stg}	Storage temperature		- 40~110	°C

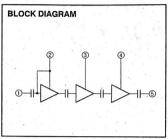
Symbol	Parameter	Tara accidence	Limits		10.0
Syllibol	rarameter	Test conditions	Min	Max	Unit
f	Frequency range		335	360	MHz
Po	Output power	Pin = 0.3W	30	100 - 100	W
ηт	Total efficiency	Vcc = 12.5V	40	and the	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	16. 10	- 30	dB
Pin	Input VSWR			2.8	11
-	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. ZG = 50 Ω	No degradation		_



M57729SL

360~380MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

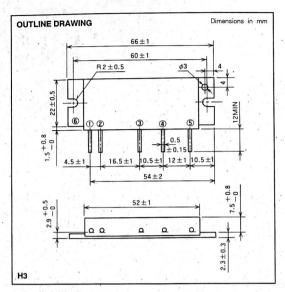
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc.	Total current		10	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		-30~110	97
Tstg	Storage temperature		-40~110	2

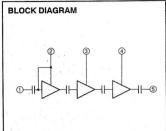
Symbol	Parameter	Test conditions	Limits		10.20
		rest conditions	Min	Max	Unit
f	Frequency range		360	380	MHz
Po	Output power	Pin = 0.3W Vcc = 12.5V Zc = ZL = 50 Ω	30	000	W
ηT	Total efficiency		40	A	%
2fo	2nd. harmonic		40	- 30	
Pin	Input VSWR				dB
13 (T. 1)				2.8	-
-	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin : controlled) Load VSWR=20:1 (AII phase), 2sec. Zc = 50Ω	No degradation		-



M57729UL

380~400MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VCC2 : 2nd. DC SUPPLY
④ VCC3 : 3rd. DC SUPPLY
⑤ PO : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

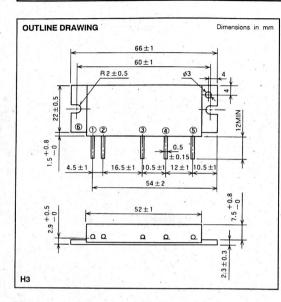
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		10	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$. 40	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	2

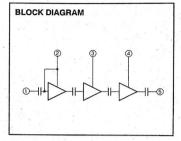
Symbol	0	Test conditions	Limits		11.4
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		380	400	MHz
Po	Output power	Pin = 0.3W	30	198	W
ηΤ	Total efficiency	Vcc = 12.5V .	40	1.10 (515)	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	Late of the same	- 30	dB
Pin	Input VSWR			2.8	945 -
	Load VSWR tolerance	$\label{eq:controlled} \begin{array}{l} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 30\text{W} \;\; (\text{P}_{\text{in}}: \text{controlled}) \\ \text{Load} \;\; \text{VSWR=}20:1 \;\; (\text{All phase}), 2\text{sec.} \\ \text{Zg} = 50 \;\; \Omega \\ \end{array}$	No degradation		-



M57729L

400~420MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

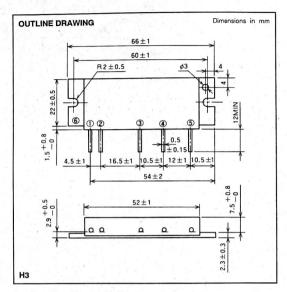
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		10	Δ
Pin(max)	Input power	Z _G = Z _L = 50 Ω	0.6	W
Po(max)	Output power	Z _G = Z _L = 50 Ω	40	W
TC(OP)	Operation case temperature	The state of the s	- 30~110	90
Tstg	Storage temperature		-40~110	90

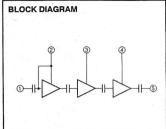
Symbol	Parameter	Test conditions	Limits		1 3 m
		rest conditions	Min	Max	Unit
f	Frequency range		400	420	MHz
Po	Output power	P _{in} = 0.3W Vcc = 12.5V	30	120	W
ηт	Total efficiency		40		
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	40		%
Q in	Input VSWR	20 - 20 - 30 %	1 - 2 -	- 30	dB
PIII	Input VSVIA			2.8	
_	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 30\mbox{W} \ \mbox{(Pin: controlled)} \\ \mbox{Load VSWR=20:1 (All phase), 2sec.} \\ \mbox{Zg} = 50\ \Omega \\ \end{array} $	No degradation		_



M57729

430~450MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:
①Pin:RF INPUT

② VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY ④ VCC3: 3rd. DC SUPPLY ⑤ PO: RF OUTPUT

6GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

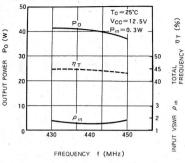
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		10	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	2

Symbol Parameter f Frequency range	D	Test conditions	Limits		115-76
	Parameter	rest conditions	Min	Max	Unit
		430	450	MHz	
Po	Output power	Pin = 0.3W	30	The State of	W
ηт	Total efficiency	Vcc = 12.5V	40		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	1,000	- 30	dB
p in	Input VSWR			2.8	
-	Load VSWR tolerance	$Vcc = 15.2V$, $Po = 30W$ (P_{In} : controlled) Load VSWR=20:1(AII phase), 2sec. $Z_G = 50$ Ω	No degradation		-

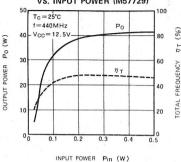


430~450MHz, 12.5V, 30W, FM MOBILE RADIO

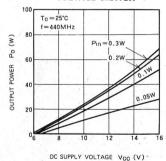




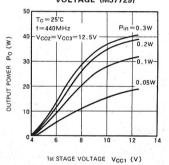
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57729)



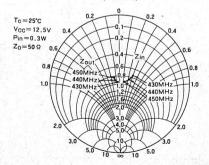
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57729)



OUTPUT POWER VS. 1st STAGE VOLTAGE (M57729)



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY (M57729)



430~450MHz, 12.5V, 30W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 12^{\circ}C/W \text{ (Typ.)}$

b) Second stage transistor

 $R_{th(i-c)2} = 4$ °C/W (Typ.)

- c) Final stage transistor
- $R_{th(j-c)3} = 2^{\circ}C/W \text{ (Typ.)}$
- (2) Junction temperature of incorporated transistors at stadard operation.
- Conditions for standard operation.

 $P_{O}=30W,\ V_{CC}=12.5V,\ P_{in}=0.3W,\ \eta_{T}=40\%$ (minimum rating), $P_{O1}^{(Note \ 1)}=2.0W,\ P_{O2}^{(2)}=8.0W,\ I_{T}=6.0A$ ($I_{T1}^{(3)}=0.35A,\ I_{T2}^{(4)}=1.32A,\ I_{T3}^{(5)}=4.33A$)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(6)}$$

$$= (12.5 \times 0.35 - 2.0 + 0.3) \times 12 + T_{C}$$

 $= 32 + T_{c} (^{\circ}C)$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

 $T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_{c}$ = (12.5 x 1.32 - 8.0 + 2.0) x 4 + T_c

 $= 42 + T_{c} (^{\circ}C)$

Junction temperature of the final stage transistor

 $T_{j3} = (V_{CC} \times I_{T3} - P_0 + P_{02}) \times R_{th(j-c)3} + T_c$ = (12.5 x 4.33 - 30 + 8) x 2 + T_c = 64 + T_c (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^{\circ}$ C) and at the output power of 7W below 90°C.

The thermal resistance R_{th(c-a)}⁽⁷⁾ of the heat sink to realize this:

$$R_{\text{th}(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{\text{in}}} = \frac{90 - 60}{(30/0.4) - 30 + 0.3}$$
$$= 0.66 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

$$T_{j1} = 122^{\circ}C$$
, $T_{j2} = 132^{\circ}C$, $T_{j3} = 155^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{c} = 90^{\circ}C$.

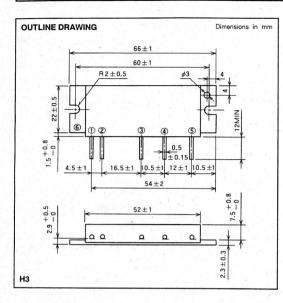
In the annual average of ambient temperature is 30°C,

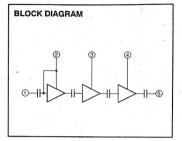
 $T_{i1} = 92^{\circ}C$, $T_{i2} = 102^{\circ}C$, $T_{i3} = 125^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57729H

450~470MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		10	Δ
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

Symbol	Parameter	Test conditions	Limits		7 . A. N.
	Control of the second second	rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0,3W Vcc = 12.5V	450	470	MHz
Po	Output power		30	1 3 100	W
ηт	Total efficiency		40	11 20 11	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	1 13 3 2	- 30	dB
Pin	Input VSWR		1	2.8	-
-	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin: controlled) Load VSWR-20:1(All phase), 2sec. Zo = 50Ω	No degradation		-

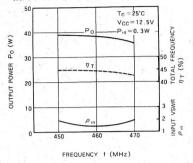


M57729H

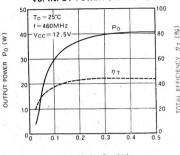
450~470MHz, 12.5V, 30W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57729H)

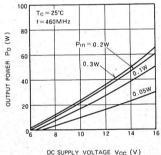


OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57729H)

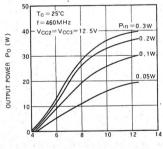


INPUT POWER Pin (W)

OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57729H)



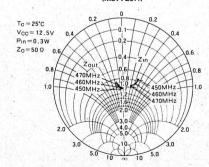
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57729H)



1st STAGE VOLTAGE VCC1 (V)

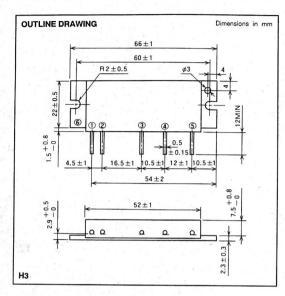
DC SUPPLY VOLTAGE VCC (V)

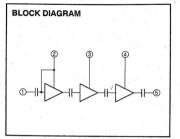
OUTPUT IMPEDANCE, INPUT IMPEDANCE VS. FREQUENCY (M57729H)



M57729UH

470~490MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

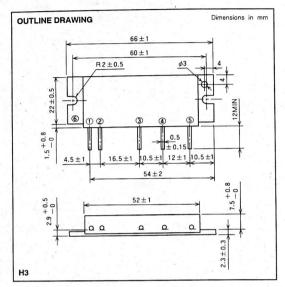
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	1/
Icc	Total current		10	
Pin(max)	Input power	Z _G = Z _L = 50 Ω	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

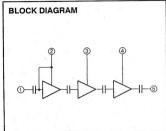
Symbol	Parameter	Test conditions	Lir	Limits	
		rest conditions .	Min	Max	Unit
7	Frequency range	P _{in} = 0.3W Vcc = 12.5V	470	490	MHz
Po	Output power		30	10 - 1 5 9	W
ηт	Total efficiency		40	Contraction of	
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	40	20	%
Pin	Input VSWR			- 30	dB
	mpat rount			2.8	-
-1	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Zo = 50 \(\Omega\$	No degradation		_



M57729SH

490~512MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1 st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ VCC3: 3nd. DC SUPPLY
⑤ PO: RF OUTPUT
⑥ GND: FIN

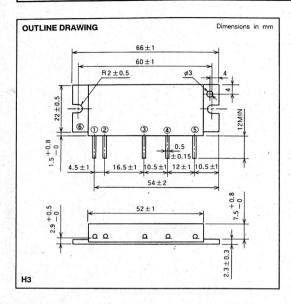
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

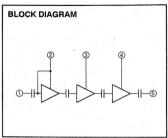
Symbol Parameter		Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		10	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50^{\circ}\Omega$	40	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstq	Storage temperature		-40~110	℃

Carlet		T 200	Limits		1144
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		490	512	MHz
Po	Output power	$P_{\text{in}} = 0.3W$ $V_{\text{CC}} = 12.5V$ $Z_{\text{G}} = Z_{\text{L}} = 50 \Omega$	30	100	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic			- 30	dB
P in	Input VSWR			2.8	
_	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin : controlled) Load VSWR=20:1 (AII phase), 2sec. Zg = 50Ω	No degradation		-



453~457.5MHz, 12.5V, 30W, FM MOBILE RADIO





①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

④ VCC3 : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT

@GND : FIN

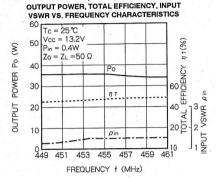
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		8	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	35	W
TC(OP)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	°C

Symbol	Parameter	Test conditions	Limits		100
	raiametei	Test conditions	Min	Max	Unit
f	Frequency range	$P_{In} = 0.4W$ $V_{CC} = 13.2V$ $Z_{C} = Z_{L} = 50 Ω$	453	457.5	MHz
Po	Output power		30	C. WIFE BUILD	W
ηΤ	Total efficiency		35		%
2fo	2nd. harmonic		1 P. 11 T. G. G.	- 30	dB
<i>p</i> in	Input VSWR			2	-
-	Load VSWR tolerance	Vcc = 15.2V, Po = 2BW (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Zo = 50Ω	No degradation		-







OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

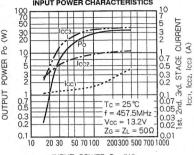
8

8

Во

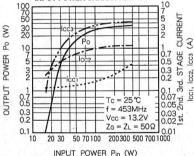
POWER

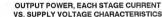
DUTPUT

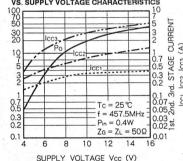


INPUT POWER Pin (W)

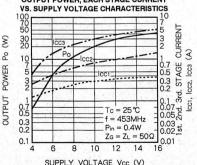
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



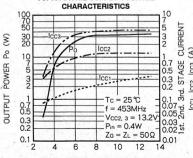




OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

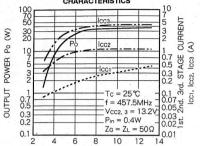


OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



1st STAGE SUPPLY VOLTAGE Vcc1 (V)

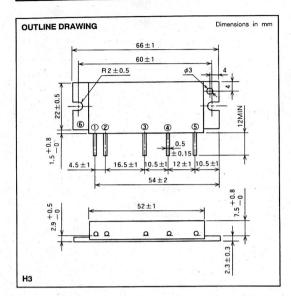
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

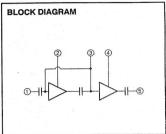


1st STAGE SUPPLY VOLTAGE Vcc1 (V)

M57735

50~54MHz, 12.5V, 19W, SSB MOBILE RADIO





PIN:
①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VBB: BASE BIAS
④VCC2: 2nd. DC SUPPLY
⑤PO: RF OUTPUT
⑥GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

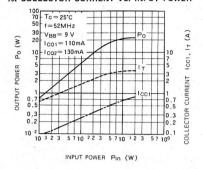
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
VBB	Base bias		10	V
Icc	Total current		6	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	25	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		-40~110	2

Symbol	D.	Test conditions	Limits		Unit
	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		50	54	MHz
Po	Output power	Pin = 0.2W	19	111446	W
ηт	Total efficiency	Vcc = 12.5V	40		%
2fo	2nd. harmonic	V _{BB} = 9V		- 25	dB
3fo .	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	1 1 1 1 1 1 1 1	- 30	dB
<i>p</i> in	Input VSWR		11.00	2.2	-
_	Load VSWR tolerance	Vcc = 15.2V, VBB = 9V Po = 14W (Pin: controlled) Load VSWR \geq 20:1(All phase) Zg = 50 Ω	No degradation		-

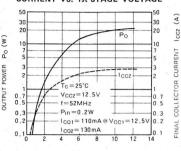


50~54MHz, 12.5V, 19W, SSB MOBILE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL COLLECTOR CURRENT 1st COLLECTOR CURRENT VS. INPUT POWER

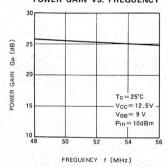


OUTPUT POWER, FINAL COLLECTOR CURRENT VS. 1st STAGE VOLTAGE

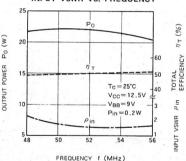


1st SUPPLY VOLTAGE VCC1 (V)

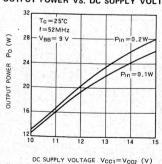
POWER GAIN VS. FREQUENCY



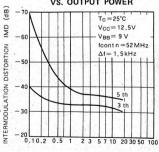
OUTPUT POWER, TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY



OUTPUT POWER VS. DC SUPPLY VOLTAGE



INTERMODULATION DISTORTION VS. OUTPUT POWER

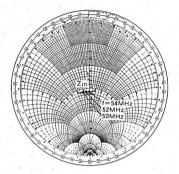


OUTPUT POWER POPEP (W)



50~54MHz, 12.5V, 19W, SSB MOBILE RADIO

INPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 10^{\circ} C/W (Typ.)$$

b) Final stage transistor

$$R_{th(j-c)2} = 2^{\circ}C/W \text{ (Typ.)}$$

- (2) Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

$$\begin{array}{l} P_{\rm O} = 14 {\rm W}, \, {\rm V}_{\rm CC} = 12.5 {\rm V}, \, {\rm P}_{\rm in} = 0.07 {\rm W}, \, \eta_{\rm T} = 40 {\rm W} \, \, ({\rm minimum \, rating}), \, P_{\rm O1} \, ({\rm Note \, 1}) = 2.5 {\rm W}, \, \, {\rm I}_{\rm T} = 2.8 {\rm A} \, \, ({\rm I}_{\rm T1} \, ^{(2)} = 0.5 {\rm A}, \, {\rm I}_{\rm T2} \, ^{(3)} = 2.3 {\rm A}) \end{array}$$

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

= 39 + T_c (°C)

Note 4: Package temperature of device

• Junction temperature of the final stage transistor $T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th(j-c)2} + T_c$

=
$$(12.5 \times 2.3 - 14 + 2.5) \times 2 + T_C$$

= $35 + T_C$ (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a=60^\circ C$) and at the output power of 14W below $90^\circ C$.

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this:

$$R_{\text{th}(c-a)} = \frac{T_c - T_a}{(P_0/\eta_T) - P_0 + P_{\text{in}}} = \frac{90 - 60}{(14/0.4) - 14 + 0.07}$$
$$= 1.42 \, (^{\circ}\text{C/W})$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

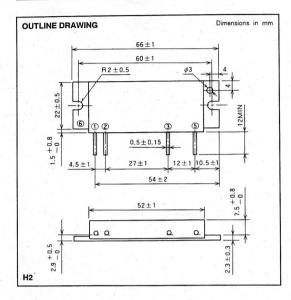
Mounting the heat sink of the above thermal resistance on the device,

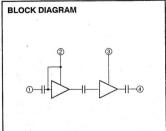
 T_{j1} = 129°C, T_{j2} = 125°C at T_a = 60°C, T_c = 90°C. In the annual average of ambient temperature is 30°C,

 $T_{j1} = 99^{\circ}C, T_{j2} = 95^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175° C, application under fully derated condition is ensured.

144~148MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st: DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ PO: RF OUTPUT
⑤ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		7	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		- 30~110	2
Tsta	Storage temperature		- 40~110	%

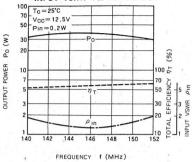
Symbol Parameter	D	Test conditions	Limits		11-14
	Farameter	lest conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	30		W
ηт	Total efficiency		45		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	25 - 26 - 30 52		- 30	dB
Pin	Input VSWR			2.8	-
- 1	Load VSWR tolerance	$\label{eq:Vcc} \begin{array}{l} \text{Vcc} = 15.2\text{V}, \\ \text{Po} = 35\text{W} \text{ (Pin: controlled)} \\ \text{Load VSWR} = 20:1 \text{ (All phase), 5sec.} \\ \text{Zg} = 50\Omega \end{array}$	No degradation		-



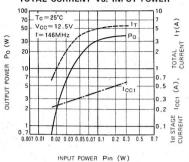
144~148MHz, 12.5V, 30W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

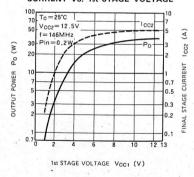
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



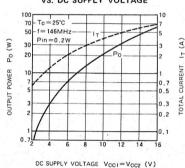
OUTPUT POWER, 1st STAGE CURRENT, TOTAL CURRENT VS. INPUT POWER



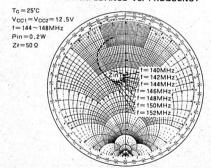
OUTPUT POWER, FINAL STAGE CURRENT VS. 1st STAGE VOLTAGE



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE



INPUT INPEDANCE VS. FREQUENCY





DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 8^{\circ}C/W$$
 (Typ.)

b) Second stage transistor

$$R_{th(i-c)2} = 2^{\circ}C/W$$
 (Typ.)

- (2) Junction temperature of incorporated transistors at stadard operation.
- · Conditions for standard operation.

$$P_0$$
 = 28W, V_{CC} = 12.5V, P_{in} = 0.2W, η_T = 45% (minimum rating), P_0 1 (Note 1) = 5W, I_{T_1} = 5.0A { I_{T_1} ⁽²⁾ = 0.9A, I_{T_2} ⁽³⁾ = 4.1A)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th\{j-c\}1} + T_c^{(4)}$$

$$= (12.5 \times 0.9 - 5 + 0.2) \times 8 + T_c$$

$$= 52 + T_c (^{\circ}C)$$

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th}(j_{-c})_2 + T_c$$

= (12.5 x 4.1 - 28 + 5) x 2 + T_c
= 57 + T_c (°C)

2. Heat sink design;

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^{\circ}C$) and at the output power of 28W below 90°C.

The thermal resistance Rth(c-a) (5) of the heat sink to real-

$$R_{\text{th (c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(28/0.45) - 28 + 0.2}$$
$$= 0.87 \, (^{\circ}\text{C/W})$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

 $T_{i1} = 142$ °C, $T_{i2} = 147$ °C at $T_a = 60$ °C, $T_c = 90$ °C. In the annual average of ambient temperature is 30°C,

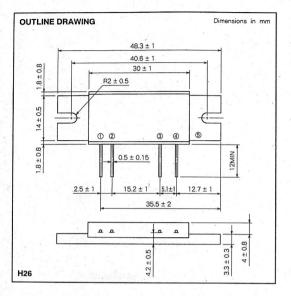
 $T_{j1} = 112^{\circ}C, T_{j2} = 118^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



M57739C

824~849MHz, 12.5V, 6W, FM MOBILE RADIO



PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ PO: RF OUTPUT
⑤ GND: FIN

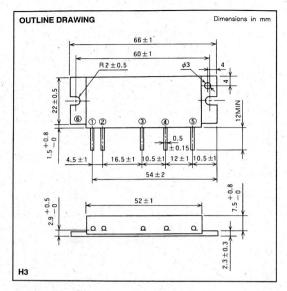
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter .	Conditions	Ratings	Unit
Vccı	1st. DC Supply		16	V
Vcc2	2nd. DC Supply		17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	3	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 12.5V	100	mW
Po(max)	Output power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 12.5V	12	W
Tc(op)	Operation case temperature	$Z_G = Z_L = 50 \Omega$	-30~110	90
Tstg	Storage temperature		-40~110	°C

Symbol	Parameter	Test conditions	Lir	nits	
D. C. Asir		rest conditions	Min	Max	Unit
t la	Frequency range	Vcc1 = Vcc2 = 12.5V	824	849	MHz
Po	Output power		6	100000000000000000000000000000000000000	- W
ηт	Total efficiency	Pin = 30mW	35	100	%
2fo, 3fo	2nd, 3rd. harmonic	$Z_G = Z_L = 50 \Omega$	W	- 30	dB
ρ in	Input VSWR			2.5	-
_	Load VSWR tolerance	Vcc1 = Vcc2 = 15.2V Po = 6W (Pin : controlled), Z _G = 50Ω Load VSWR=20:1 (Al1 phase), 5sec.	No degradation		-



889~915MHz, 12.5V, 13W, FM MOBILE RADIO



PIN:

①Pin : RF INPUT
②VCc1 : 1st. DC SUPPLY
③VCc2 : 2nd. DC SUPPLY
④VCc3 : 3rd. DC SUPPLY
⑤PO : RF OUTPUT

6GND : FIN

그렇게는 그렇게 뭐하는 맛에서 뭐 그래는 맛이 그릇 나를 되었습니까?

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 12.5 \text{V}$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	18	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		-40~110	90

ELECTRICAL CHARACTERISTICS ($T_C = 25 \, ^{\circ}\!\! \text{C}$ unless otherwise noted)

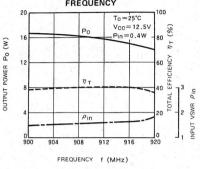
Symbol	Symbol Parameter	Test conditions	Limits		1
		rest conditions	Min	Max	Unit
	Frequency range		889	915	MHz
Po	Output power	$V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$ $P_{in} = 0.4W$	13	100000000000000000000000000000000000000	W
ηТ	Total efficiency		30	4-4/26	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	2 22	- 25	dB
P in	Input VSWR			2.5	-
-	Load VSWR tolerance	Vcc1 = Vcc2 = Vcc3 = 15.2V Po = 14W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec.	No degradation		_



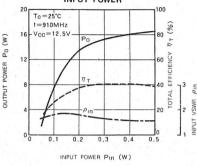
889~915MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL CHARACTERISTICS

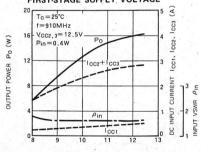
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. INPUT POWER



OUTPUT POWER, EACH STAGE DC CURRENT, INPUT VSWR VS. FIRST-STAGE SUPPLY VOLTAGE



1st STAGE VOLTAGE VCC1 (V)

889~915MHz, 12.5V, 13W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(i-c)1} = 15^{\circ}C/W \text{ (Typ.)}$

 $R_{th(j-c)1} = 15 \text{ C/W (1y)}$ b) Second stage transistor

 $R_{th(j-c)2} = 6^{\circ}C/W$ (Typ.)

c) Final stage transistor

- R_{th(j-c)3} = 2.5°C/W (Typ.)
 (2) Junction temperature of incorporated transistors at stadard operation.
 - · Conditions for standard operation.

 $P_0 = 13W$, $V_{CC} = 12.5V$, $P_{in} = 0.4W$, $\eta_T = 35\%$ (minimum rating), $P_{O1}^{\text{(Note 1)}} = 1.6W$, $P_{O2}^{\text{(2)}} = 6W$, $I_T = 3.0A$ ($I_{T1}^{\text{(3)}} = 0.25A$, $I_{T2}^{\text{(4)}} = 0.75A$, $I_{T3}^{\text{(5)}} = 2A$)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

• Junction temperature of the first stage transistor $T_{j1} = (V_{CC} \times |T_{11} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_{c}^{(6)}$ = $(12.5 \times 0.25 - 1.6 + 0.4) \times 15 + T_{c}$ = $29 + T_{c}$ (°C)

Note 6: Package temperature of device

- Junction temperature of the second stage transistor
 T_{j2} = (V_{CC} × I_{T2} P_{O2} + P_{O1}) x R_{th (j-c)2} + T_C = (12.5 × 0.75 6 + 1.6) × 6 + T_C
 = 29.9 + T_C(°C)
- Junction temperature of the final stage transistor $T_{j3} = (V_{CC} \times I_{T3} P_0 + P_{02}) \times R_{th}(j_{-c})_3 + T_c$ = (12.5 x 2 - 13 + 6) x 2.5 + T_c = 45 + T_c (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a=60^\circ C$) and at the output power of 13W below $90^\circ C$.

The thermal resistance $R_{th(c-a)}^{(7)}$ of the heat sink to realize this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(13/0.35) - 13 + 0.4}$$
$$= 1.2 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

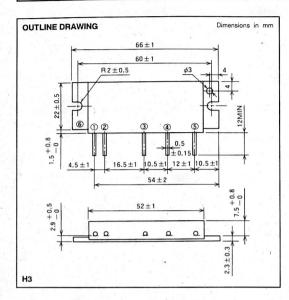
$$T_{j1}$$
 = 119°C, T_{j2} = 120°C, T_{j3} = 135°C at T_a = 60°C, T_c = 90°C.

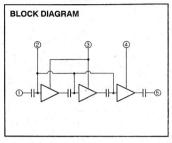
In the annual average of ambient temperature is 30°C,

 $T_{i1} = 89^{\circ}C$, $T_{i2} = 90^{\circ}C$, $T_{i3} = 105^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are $175^{\circ}C$, application under fully derated condition is ensured.

430~450MHz, 12.5V, 33W, SSB MOBILE RADIO





PIN:

Pin : RF INPUT

Van : BASE BIAS

VCC1 : 1st. DC SUPPLY

VCC2 : 2nd. DC SUPPLY

PO : RF OUTPUT

GRND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

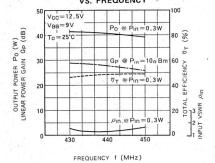
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1		17	V
Vвв	Supply voltage		10	V
lcc	Total current		10	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0,5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		-30~110	2
Tstg	Storage temperature		- 40~110	℃

Symbol	D	Test conditions	Limits		
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range	<u> </u>	430	450	MHz
Po	Output power	Pin = 0.3W Vcc = 12.5V VBB = 9V	33		W
ηт	Total efficiency		40		%
2fo	2nd. harmonic	$Z_{\rm G} = Z_{\rm L} = 50 \Omega$		- 30	dB
p in	Input VSWR	25 25 50 %		2.5	-1
-	Load VSWR tolerance	Vcc = 15.2V, V _{BB} = 9V Po = 30W (Pin: controlled) Load VSWR=8.8:1 (All phase), 2sec. Zc = 50 Ω	No degradation		-

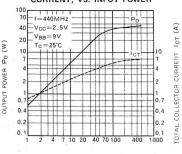


TYPICAL PERFORMANCE DATA

OUTPUT POWER, LINEAR POWER GAIN, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY

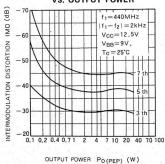


OUTPUT POWER, TOTAL COLLECTOR CURRENT, VS. INPUT POWER

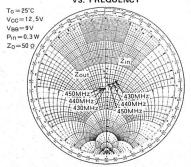


INPUT POWER Pin (mW)

INTERMODULATION DISTORTION VS. OUTPUT POWER



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY



430~450MHz, 12.5V, 33W, SSB MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(j-c)1} = 12^{\circ}C/W \text{ (Typ.)}$$

b) Second stage transistor

$$R_{th(j-c)2} = 4^{\circ}C/W$$
 (Typ.)

c) Final stage transistor

$$R_{th(j-c)3} = 1.75^{\circ}C/W \text{ (Typ.)}$$

- Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

$$P_0 = 30W$$
, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 40\%$ (minimum rating), P_{01} (Note 1) = $2W$, P_{02} (2) = $8W$, $I_T = 6A$ (I_{T1} (3) = $0.35A$, I_{T2} (4) = $1.32A$, I_{T3} (5) = $4.33A$)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

. Junction temperature of the first stage transistor

$$\begin{split} T_{j1} &= (V_{CC} \times I_{T1} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_c^{(6)} \\ &= (12.5 \times 0.35 - 2 + 0.3) \times 12 + T_c \\ &= 32 + |T_c|^{\circ}C) \end{split}$$

Note 6: Package temperature of device

- Junction temperature of the second stage transistor
 T_j = (V_CC x | T₂ P_{O2} + P_{O1}) x R_{th (j-c)2} + T_c
 = (12.5 x 1.32 8 + 2) x 4 + T_C
 = 42 + T_C (°C)
- Junction temperature of the final stage transistor $T_{j3} = (V_{CC} \times I_{T3} P_0 + P_{O2}) \times R_{th}(j_{-c})_3 + T_c$ = $(12.5 \times 4.33 - 30 + 8) \times 1.75 + T_c$ = $56 + T_c$ (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}C$) and at the output power of 30W below $90^{\circ}C$.

The thermal resistance $R_{th(c-a)}$ ⁽⁷⁾ of the heat sink to realize this:

$$R_{\text{th (c-a)}} = \frac{T_{\text{c}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(30/0.4) - 30 + 0.3}$$
$$= 0.66 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink.

Mounting the heat sink of the above thermal resistance on

$$T_{j1} = 122^{\circ}C$$
, $T_{j2} = 132^{\circ}C$, $T_{j3} = 146^{\circ}C$ at $T_a = 60^{\circ}C$, $T_c = 90^{\circ}C$.

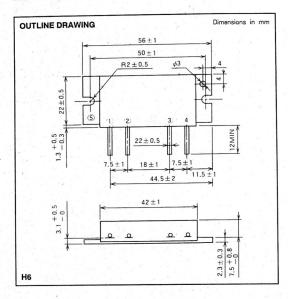
In the annual average of ambient temperature is 30°C,

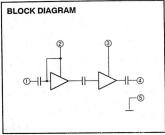
$$T_{i1} = 92^{\circ}C$$
, $T_{i1} = 102^{\circ}C$, $T_{i3} = 116^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



144~148MHz, 12.5V, 13W, FM MOBILE RADIO





PINNING:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③VCC2: FINAL DC SUPPLY ④PO : RF OUTPUT

GGND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		5	A
Pin(max)	Input power	V_{CC1} ≤ 12.5 V , $Z_G = Z_L = 50 Ω$	0.4	W
Po(max)	Output power	Same as above	20	W
Tc(op)	Operation case temperature	Same as above	- 30~+110	. ℃
Tstg	Storage temperature		- 40~+ 110	℃

Note: Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (Tc = 25 °C unless otherwise noted)

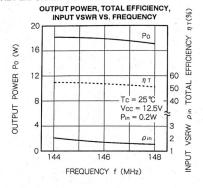
		Too, and distant	Lim	Limits	
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power		13		W
ηт	Total efficiency	Pin = 0.2W	48	B. C. F.	%
2fo	2nd. harmonic	$V_{CC} = 12.5V$ $Z_{G} = Z_{L} = 50 \Omega$		- 25	dB
3fo	3rd. harmonic	ZG - ZL - 50 W		- 35	dB
p in	Input VSWR			2.8	
1	Load VSWR tolerance	$V_{CC} = 15.2V$ $P_{O} = 14W$ (Pin: controlled) $\rho L = 20: 1$ (All phase) $Z_{G} = 50 \Omega$	No degradation or destroy		

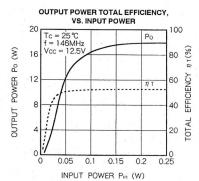
Above parameters, ratings, limits and conditions are subject to change.

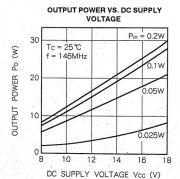


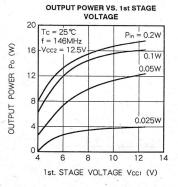
144~148MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA









144~148MHz, 12.5V, 13W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor
 - Rth(j-c)1 = $10 \, \text{C/W(Typ.)}$ b) Final stage transistor Rth(j-c)2 = $3 \, \text{C/W(Typ.)}$
- (2) Junction temperature of incorporated transistors at standard operation.
 - Conditions for standard operation. $P_0 = 13W$, $V_{CC} = 12.5V$, $P_{In} = 0.2W$, $\eta T = 48 \%$.

(minimum rating). Pot (Note1) = 2.5W, $|T| = 2.2A(|T|^{(2)}) = 0.45A$, $|T|_2^{(3)} = 1.75A$)

Note1: Output power of the first stage transistor Note2: Circuit current of the first stage transistor Note3: Circuit current of the first stage transistor

• Junction temperature of the first stage transistor $T_{j1} = (Vcc \times I_{T1} - Po_1 + P_{in}) \times Rth(j-c)_1 + Tc^{(4)}$ $= (12.5 \times 0.45 - 2.5 + 0.2) \times 10 + Tc$

= $(12.5 \times 0.45 - 2.5 + 0.2) \times 10 + Tc$ = 33 + Tc(°C)

Note4: Package temperature of device

• Junction temperature of the final stage transistor $T_{j2} = (Vcc \times I_{T2} - Po + Po_1) \times R_{th(j-c)2} + Tc$

=
$$(12.5 \times 1.75 - 13 + 2.5) \times 3 + \text{Tc}$$

= $34 + \text{Tc}(^{\circ}\text{C})$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $Ta = 60\,^{\circ}\text{C}$) and at the output power of 13W below $90\,^{\circ}\text{C}$.

The thermal resistance $R_{th(c-a)}^{(5)}$ of the heat sink to realize this

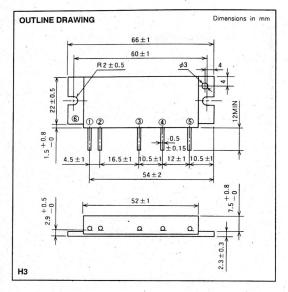
$$R_{th(c-a)} = \frac{T_c - T_a}{(P_0/\eta T) - P_0 + P_{in}} = \frac{90 - 60}{(13/0.48) - 13 + 0.2}$$
$$= 2.8(°C/W)$$

Note5 : Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

$$T_{j1}=113\,\%$$
, $T_{j2}=134\,\%$ at $T_a=60\,\%$, $T_c=90\,\%$, In the annual average of ambient temperature is $30\,\%$, $T_{j1}=103\,\%$, $T_{j2}=104\,\%$

903~905MHz, 12.5V, 7W, FM MOBILE RADIO



PIN:
①Pin:: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY

⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		3	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 12.5 V$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	%
Tstg	Storage temperature		-40~110	%

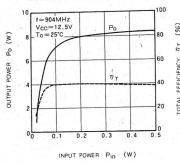
Symbol	Parameter	Test conditions	Limits		1
	i arameter	rest conditions	Min	Max	Unit
f	Frequency range		903	905	MHz
Po	Output power	Vcc1 = Vcc2 = Vcc3 = 12.5V	7	77 July 197	W
ηТ	Total efficiency	Pin = 0.2W	30		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	of the	- 30	dB
ρ in	Input VSWR			2.5	- GD
- 1	Load VSWR tolerance	Vcc1 = Vcc2 = Vcc3 = 15.2V Po = 7W (Pin: controlled), ZG = 50Ω Load VSWR=20:1 (All phase), 2sec.			-



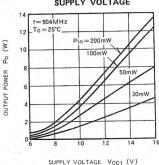
903~905MHz, 12.5V, 7W, FM MOBILE RADIO

TYPICAL CHARACTERISTICS

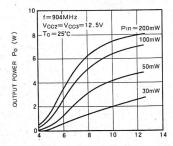
OUTPUT POWER, TOTAL EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. SUPPLY VOLTAGE



OUTPUT POWER VS. FIRST-STAGE SUPPLY VOLTAGE



FIRST-STAGE SUPPLY VOLTAGE VCC1 (V)

903~905MHz, 12.5V, 7W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 13^{\circ}C/W \text{ (Typ.)}$

b) Second stage transistor

 $R_{th(j-c)2} = 9^{\circ}C/W$ (Typ.)

c) Final stage transistor

 $R_{th(i-c)3} = 4^{\circ}C/W \text{ (Typ.)}$

(2) Junction temperature of incorporated transistors at stadard operation.

Conditions for standard operation.

- P_0 = 7W, V_{CC} = 12.5V, P_{in} = 0.2W, η_T = 30% (minimum rating), P_{01} (Note 1) = 1.5W, P_{02} (2) = 3.6W, I_T = 1.87A (I_{T1} (3) = 0.21A, I_{T2} (4) = 0.48A, I_{T3} (5) = 1.17A)
- Note 1: Output power of the first stage transistor
- Note 2: Output power of the second stage transistor
- Note 3: Circuit current of the first stage transistor
- Note 4: Circuit current of the second stage transistor
- Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_c^{(6)}$$

$$= (12.5 \times 0.21 - 1.5 + 0.2) \times 13 + T_c$$

$$= 17 + T_c^{(9)}$$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_{c}$$

= (12.5 × 0.48 - 3.6 + 1.5) × 9 + T_c

$$= 35 + T_{C} (^{\circ}C)$$

Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_0 + P_{02}) \times R_{th(j-c)3} + T_C$$

= (12.5 × 1.17 - 7 + 3.6) x 4 + T_C

= 45 + Tc (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a=60^{\circ}C$) and at the output power of 7W below $90^{\circ}C$.

The thermal resistance $R_{th\{c-a\}}^{(7)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.3) - 7 + 0.2}$$
$$= 1.81 (^{\circ}C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device

$$T_{j1}$$
 = 107°C, T_{j2} = 125°C, T_{j3} = 135°C at T_a = 60°C, T_c = 90°C.

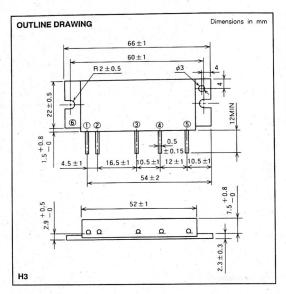
In the annual average of ambient temperature is 30°C,

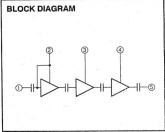
$$T_{i1} = 77^{\circ}C$$
, $T_{i2} = 95^{\circ}C$, $T_{i3} = 105^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



430~450MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY

@VCC3: 3nd. DC SUPPLY (5) Po : RF OUTPUT (6) GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc .	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.4	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$. 20	W
Tc(op)	Operation case temperature	The second secon	-30~110	℃
Tstg	Storage temperature		-40~110	°C

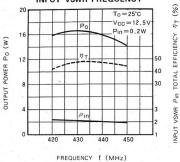
Combal		Test conditions	Limits		Unit
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	13		W
ηΤ	Total efficiency		35		%
2fo	2nd. harmonic			- 30	dB
Pin	Input VSWR			2.8	
_	Load VSWR tolerance	$ \begin{array}{l} V_{CC} = 15.2V, \\ Po = 13W \; (P_{in}: controlled) \\ Load \; VSWR=20:1 \; (AII \; phase), 2sec. \\ Z_G = 50\Omega \end{array} $	No degradation		_



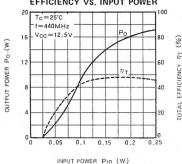
430~450MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

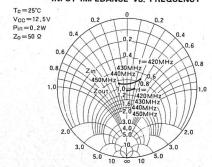
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR FREQUENCY



OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER

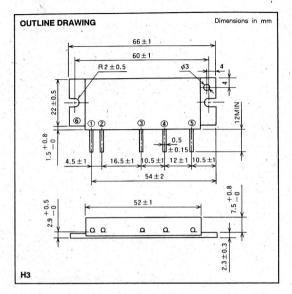


INPUT IMPEDANCE VS. FREQUENCY





806~866MHz, 12.6V, 10W, FM MOBILE RADIO



PIN:
①Pin : RF INPUT
②VCCI: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑥PO : RF OUTPUT
⑥GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

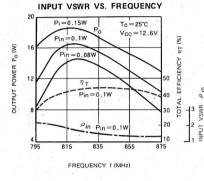
Symbol	Parameter	Conditions	Ratings	Unit
Vccı	1st. DC supply		14	V
Vcc2	2nd, DC supply		17	V
Vccз	3rd. DC supply		17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	7	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 12.6V	0.8	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	30	W
Tc(op)	Operation case temperature	$Z_G = Z_L = 50 \Omega$	-30~110	°C
Tstg	Storage temperature		-40~110	20

Symbol	Parameter	Test conditions	Limits		11.0
Symbol	Farameter	rest conditions	Min	Max	Unit
f	Frequency range	사람 [강시] 하는 사고 등론하다 되지 않다.	806	866	MHz
Po	Output power	Vcc1 = Vcc2 = Vcc3 = 12.6V	10	Y West	W
ηт	Total efficiency	Pin = 0.1W	35	G. Bak	%
2fo .	2nd. harmonic .	$Z_G = Z_L = 50 \Omega$		- 30	dB
<i>p</i> in	Input VSWR		Long to a	2.8	M 2 4
-	Load VSWR tolerance	Vcc1 = Vcc2 = Vcc3 = 15.2V Po = 10W (Pin: controlled), Zc = 50 Ω Load VSWR=20:1 (Al1 phase), 5sec.	No degradation		-

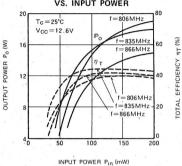


806~866MHz, 12.6V, 10W, FM MOBILE RADIO

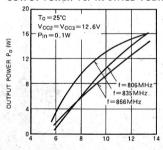
TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY,



OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER

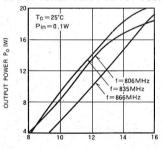


OUTPUT POWER VS. 1st STAGE VOLTAGE



1st STAGE DC SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER VS. DC SUPPLY VOLTAGE



DC SUPPLY VOLTAGE VCC (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 15^{\circ}C/W \text{ (Typ.)}$

b) Second stage transistor

 $R_{th(1-c)2} = 6.5^{\circ} \text{C/W (Typ.)}$

c) Final stage transistor

 $R_{th(i-c)3} = 4^{\circ}C/W$ (Typ.)

- (2) Junction temperature of incorporated transistors at standard operation.
- · Conditions for standard operation.

 $P_{O} = 10W$, $V_{CC} = .12.6V$, $P_{In} = 0.1W$, $\eta_{T} = 35\%$ (minimum rating), P_{O1} (Note 1) = 1W, P_{O2} (2) = 4W, $I_{T} = 2.26A$ (I_{T1} (3) = 0.3A, I_{T2} (4) = 0.56A, I_{T3} (5) = 1.4A)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transisotr

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(6)}$$

$$= (12.6 \times 0.3 - 1.0 + 0.1) \times 15 + T_{C}$$

 $= 43.2 + T_C (^{\circ}C)$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

 $T_{j2} = V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_{C}$ = (12.6 \times 0.56 - 4 + 1.0) \times 6.5 + T_{C}

 $= 26.4 + T_C (^{\circ}C)$

Junction temperature of the final stage transistor
 T_{j3} = (V_{CC} x I_{T3} - P_O + P_{O2}) x R_{th(j-c)3} + T_C

 $= (12.6 \times 1.4 - 10 + 4) \times 4 + T_C$ $= 46.6 + T_{c} (^{\circ}C)$

 $= 46.6 + T_C (^{\circ}C)$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a=60^\circ C$) and at the output power of 10W below $90^\circ C$.

The thermal resistance $R_{th(c-a)}^{(7)}$ of the heat sink to realize this:

$$R_{\text{th (c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{(P_{\text{O}}/\eta_{\text{T}}) - P_{\text{O}} + P_{\text{in}}} = \frac{90 - 60}{(10/0.35) - 10 + 0.1}$$
$$= 1.6 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device:

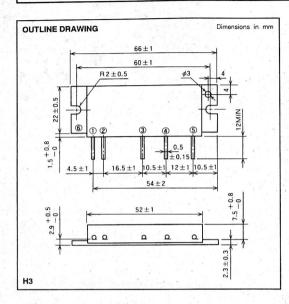
 T_{j1} = 133.2°C, T_{j2} = 116.4°C, T_{j3} = 136.6°C at T_{ϵ} = 60°C, T_{C} = 90°C.

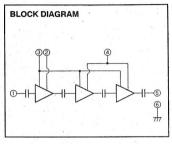
In the annual average of ambient temperature is 30°C,

 $T_{i1} = 103.2^{\circ}C$, $T_{i2} = 86.4^{\circ}C$, $T_{i3} = 106.6^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{J max} are 175°C, application under fully derated condition is ensured.

1.24~1.3GHz, 12.5V, 18W, SSB MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③VBB : BASE BIAS DC SUPPLY

④ VCC2 : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

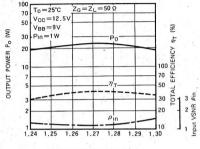
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
VBB	Base bias voltage		10	V
lcc	Total current		8	A
Pin(max)	Input power	Vcc1=12. 5V, VBB=9V, ZG=ZL=50 Ω	2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	25	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	°C

Symbol	0	Test conditions	Limits		11.0
	Parameter	rest conditions	Min	Max	Unit
f	Frequency range		1.24	1.3	GHz
Po	Output power	Vcc1 = Vcc2 = 12.5V	18		. W
ηт	Total efficiency	V _{BB} = 9V	30		%
2fo	2nd. harmonic	P _{in} = 1W	57.4	- 45	dB
Pin	Input VSWR	$Z_G = Z_L = 50 \Omega$		2.0	
laa	Base bias current			500	mA
GР	Linear power gain	$V_{CC1} = V_{CC2} = 12.5 \text{V}, V_{BB} = 9 \text{V},$ $P_{in} = 10 \text{dBm}, Z_G = Z_L = 50 \Omega$	13		dB
IMD ₃	3rd. intermodulation	Vcc1=Vcc2=12. 5V, VBB=9V, Δ f=10kHz,	Walter Control	- 24	dBc
IMDs	5th. intermodulation	Po(PEP) ≤ 14W, Zg=ZL=50Ω	A)	- 31	dBc
-	Load VSWR tolerance	Vcc1=Vcc2=15.2V, VBB=9V, Po=18W(Pin:controlled), Ze=50Ω Load VSWR=16:1(All phase), 5sec.	No degradation		-



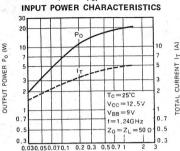
TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (MHz)

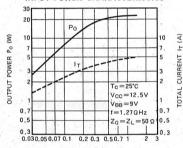
OUTPUT POWER, TOTAL CURRENT, VS.



INPUT POWER Pin (W)

OUTPUT POWER, TOTAL CURRENT, VS.

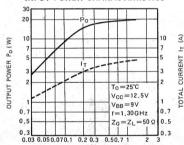
INPUT POWER CHARACTERISTICS



INPUT POWER Pin (W)

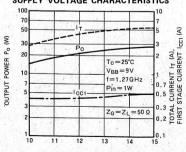
OUTPUT POWER, TOTAL CURRENT, VS.

INPUT POWER CHARACTERISTICS



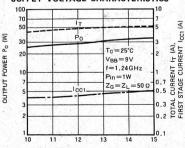
INPUT POWER Pin (W)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC1 = VCC2 (V)

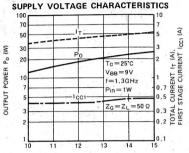
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC1 = VCC2 (V)

1.24~1.3GHz, 12.5V, 18W, SSB MOBILE RADIO

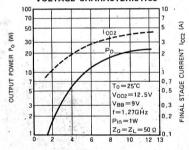
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC1 = VCC2 (V)

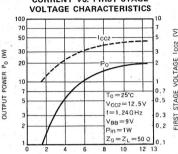
SOFTET VOLTAGE VCC1 VCC2 IV

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE CHARACTERISTICS



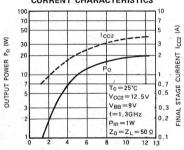
FIRST STAGE VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE



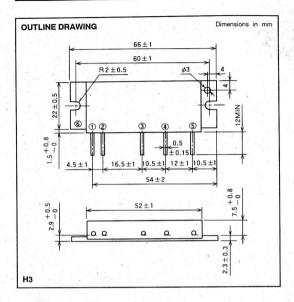
FIRST STAGE VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE CURRENT CHARACTERISTICS



FIRST STAGE VOLTAGE VCC1 (V)

806~825MHz, 12.5V, 20W, FM MOBILE RADIO



PIN:
① Pin : RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ VCC3: 3rd. DC SUPPLY
⑤ PO : RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

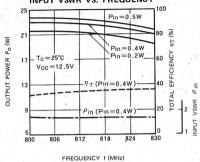
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		7	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 12.5V$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	25	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

Symbol			Limits		11-14
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		806	825	MHz
Po	Output power	V _{CC1} = V _{CC2} = V _{CC3} = 12.5V P _{In} = 0.4W Z _G = Z _L = 50 Ω	20		W
η τ 2fo	Total efficiency		30		%
2fo	2nd. harmonic			- 30	dB
ρ in	Input VSWR			2.8	-
-	Load VSWR tolerance	Vcc1 = Vcc2 = Vcc3 = 15.2V Po = 20W (Pin: controlled), $Z_G = 50\Omega$ Load VSWR=20:1 (All phase), 5sec.	No degradation		-

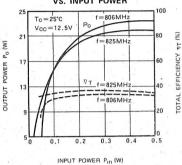


TYPICAL PERFORMANCE DATA

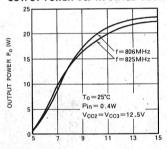
OUTPUT POWER TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER

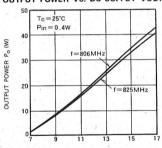


OUTPUT POWER VS. 1st STAGE VOLTAGE



1st STAGE DC SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER VS. DC SUPPLY VOLTAGE



DC SUPPLY VOLTAGE VCC (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operaton.

- (1) Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(l-c)1} = 15^{\circ}C/W$ (Typ.)

b) Second stage transistor

$$R_{th(j-c)2} = 5^{\circ}C/W \text{ (Typ.)}$$

c) Final stage transistor

$$R_{th(j-c)3} = 1.87^{\circ}C/W \text{ (Typ.)}$$

- Junction temperature of incorporated transistors at standard operation.
- Conditions for standard operation.

 $P_{O} = 20W$, $V_{CC} = 12.5V$, $P_{In} = 0.4W$, $\eta_{T} = 30\%$ (minimum rating), P_{O1} (Note 1) = 3W, P_{O2} (2) = 10W, $I_{T} = 5.33A$ (I_{T1} (3) = 0.4A, I_{T2} (4) = 1.53A, I_{T3} (5) = 3.4A)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transisotr

Junction temperature of the first stage transistor

$$\begin{split} T_{j1} &= (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(6)} \\ &= (12.5 \times 0.4 - 3 + 0.4) \times 15 + T_{C} \\ &= 36 + T_{C}^{(\circ)} C) \end{split}$$

Note 6: Package temperature of device

Junction temperature of the second stage transistor
 T_{j2} = V_{CC} × I_{T2} - P_{O2} + P_{O1}) × R_{th(j-c)2} + T_C

= $(12.5 \times 1.53 - 10 + 3) \times 5 + T_C$

 $= 60.6 + T_C (^{\circ}C)$

Junction temperature of the final stage transistor

 $T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(j-c)3} + T_C$ = (12.5 x 3.4 - 20 + 10) x 1.87 + T_C = 60.8 + T_C (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}\text{C}$) and at the output power of 20W below 90°C .

The thermal resistance $R_{th(c-a)}^{(7)}$ of the heat sink to realize this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{(P_{\text{O}}/\eta_{\text{T}}) - P_{\text{O}} + P_{\text{in}}} = \frac{90 - 60}{(20/0.3) - 20 + 0.4}$$
$$= 0.637 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$$T_{j1} = 126^{\circ}C$$
, $T_{j2} = 150.6^{\circ}C$, $T_{j3} = 150.8^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{C} = 90^{\circ}C$.

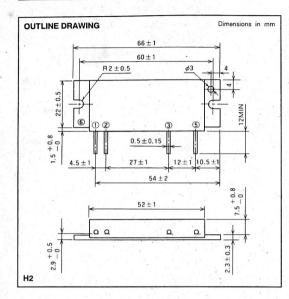
In the annual average of ambient temperature is 30°C,

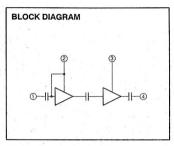
$$T_{j1} = 96^{\circ}C T_{j2} = 120.6^{\circ}C, T_{j3} = 120.8^{\circ}C.$$

As the maximum junction temperature of these incorporated transistors $T_{j\,max}$ are 175°C, application under fully derated condition is ensured.



220~225MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③VCC2 : 2nd. DC SUPPLY ④PO : RF OUTPUT

GOND : FIN.

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

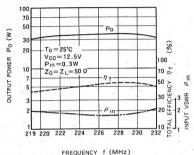
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	· V
lcc	Total current		7	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		-40~110	· °C

Symbol	Parameter	Test conditions	Lir	Limits	
Cymbol	Faranteter	rest conditions	Min	Max	Unit
f	Frequency range	220	. 225	MHz	
Po	Output power	P _{In} = 0.3W Vcc = 12.5V Z _G = Z _L ' = 50 Ω	30		W
η.τ	Total efficiency		43		%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic	2G = ZL = 50 Ω		- 35	dB
p in	Input VSWR			2.8	
-	Load VSWR tolerance	$\label{eq:controlled} \begin{array}{l} Vcc = 15.2V, \\ Po = 30W \; (P_{in}: controlled) \\ Load \; VSWR=20:1 (AII \; phase), 5sec, \\ Z_G = 50\Omega \end{array}$	No degradation		-

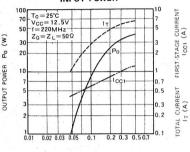


TYPICAL CHARACTERISTICS

OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER

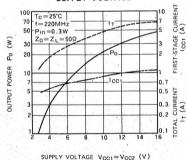


POWER

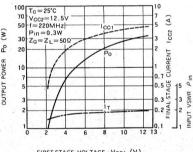
TPUT

INPUT POWER Pin (W)

OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE

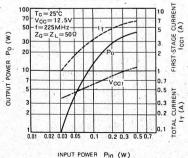


OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE

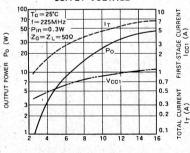


FIRST-STAGE VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER



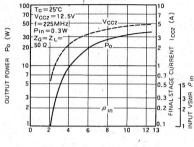
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE



SUPPLY VOLTAGE VCC1=VCC2 (V)

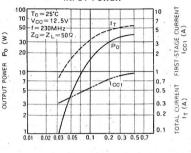
220~225MHz, 12.5V, 30W, FM MOBILE RADIO

OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE



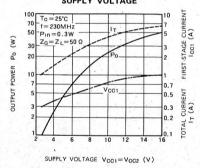
FIRST-STAGE VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER

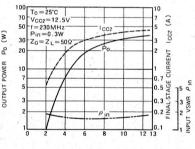


INPUT POWER Pin (W)

OUTPUT POWER, TOTAL CURRENT FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE



OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE



FIRST-STAGE VOLTAGE VCC1 (V)

DESIGN CONSIDERATION OF HEAT RADIATION

Note the following when designing a heat sink:

Junction temperature of built-in transistor at standard operation

(1) Thermal resistance between junction of built-in transistors and case

Thermal resistance between junction of 1st stage transistor and case

 $R_{th(j-c)1} = 8^{\circ}C/W \text{ (typ.)}$

Thermal resistance between junction of final stage transistor and case

$$R_{th(i-c)2} = 2^{\circ}C/W$$

- (2) Junction temperature of built-in transistor at standard operation
- Standard operating conditions

 $P_0 = 30W$, $V_{CC} = 12.5V$, $P_{In} = 0.3W$, $\eta_T = 43\%$ (rated minimum), $P_{O1} = 5W^{(Note \ 1)}$, $I_T = 5.6A$ ($I_{T1}^{(Note \ 2)} = 0.9A$, $I_{T2}^{(Note \ 3)} = 4.7A$)

Note 1: Output power of 1st stage transistor

Note 2: Current loss of 1st stage transistor

Note 3: Current loss of final stage transistor

Junction temperature of 1st stage transistor

$$\begin{split} T_{j1} &= (V_{CC} \times I_{T1} - P_{01} + P_{in}) \times R_{th(j-c)1} + T_{C}^{\text{(Note 4)}} \\ &= (12.5 \times 0.9 - 5 + 0.3) \times 8 + T_{C} \\ &= 52 + T_{C}^{\text{(°C)}} \end{split}$$

Note 4: Case temperature of device

Junction temperature of final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_0 + P_{01}) \times R_{th (j-c)2} + T_C$$

= 912.5 \times 4.7 - 30 + 5) \times 2 + T_C
= 68 + T_C (°C)

2. Heat sink design

To design the thermal characteristics of a heat sink, keep the case temperature below 90°C when output power P_0 is 28W and the upper limit of ambient temperature T_a is 60°C .

The thermal resistance $R_{th(c-a)}^{(Note 5)}$ of a heat sink to achieve this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{\frac{P_{\text{o}}}{\eta_{\text{T}}} - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{\frac{30}{0.43} - 30 + 0.3}$$

$$= 0.75 (^{\circ}C/W)$$

Note 5: Including the contact thermal resistance between the device and the heat sink

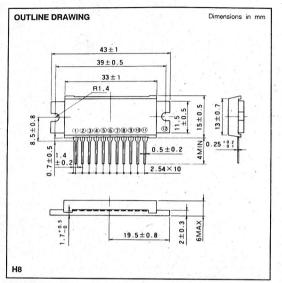
Mounting the device on the heat sink with the above thermal resistance, junction temperatures of each transistor module becomes as follows:

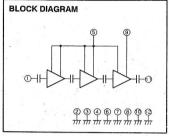
 $T_{j1} = 142^{\circ}$ C, $T_{j2} = 158^{\circ}$ C at $T_a = 60^{\circ}$ C, $T_c = 90^{\circ}$ C, Since the annual average of ambient temperature is 30° C, junction temperature of each transistor becomes as follows: $T_{j1} = 112^{\circ}$ C and $T_{j2} = 17^{\circ}$ C.

Use of these built-in transistors in temperatures below the maximum junction temperature T_{jmex} 175°C is guaranteed.



806~866MHz, 8V, 400mW, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ⑤ VccI : 1st. DC SUPPLY ⑥ Vcc2 : 2nd. DC SUPPLY ① Pro : RF OUTPUT ② 3 ④ GND ⑥ ① ⑥ GND ② GND

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

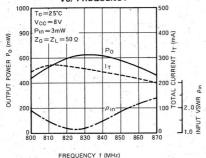
Symbol	Parameter	Conditions	Ratings	Unit
Vccı	1st. DC supply		11	V
Vcc2	2nd. DC supply		15	V
Icc	Total current		0.6	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 8V	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	0.8	W
Tc(op)	Operation case temperature		- 30~110	20
Tstg	Storage temperature		-40~110	2

Symbol	Parameter	Test conditions	Limits		Contract to
		rest conditions	Min	Max	Unit
f	Frequency range		806	866	MHz
Po	Output power	Vcc1 = Vcc2 = 8V Pin = 3mW Zg = ZL = 50 Ω	400		mW
2fo	2nd. harmonic		BANK ON	- 30	dB
Pin	Input VSWR	26 - 26 - 30 Ω		3.0	-
lτ	Total current	$ \begin{array}{l} V_{CC1} = V_{CC2} = 8V, \\ P_0 = 0.4W(P_{in}:controlled) \\ Z_G = Z_L = 50\Omega \end{array} $		290	mA
-	Load VSWR tolerance	Vcc1 = 8V, Vcc2 = 15V Po = 0.4W(Pin: controlled), $Z_G = 50\Omega$ Load VSWR=20:1(AII phase), 5sec.	No degradation		-

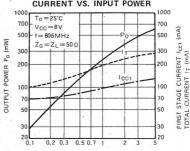


TYPICAL CHARACTERISTICS

OUTPUT POWER, TOTAL CURRENT, INPUT VSWR VS. FREQUENCY

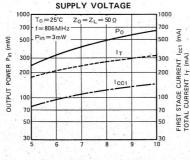


OUTPUT POWER,
TOTAL CURRENT, FIRST STAGE
CURRENT VS. INPUT POWER



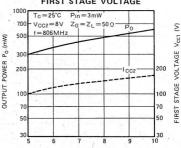
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT VS.



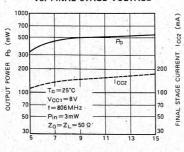
SUPPLY VOLTAGE Vcc1 = Vcc2 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE



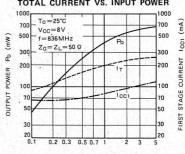
FINAL STAGE CURRENT ICC2 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FINAL STAGE VOLTAGE



FINAL STAGE VOLTAGE VCC2 (V)

OUTPUT POWER, FIRST STAGE CURRENT TOTAL CURRENT VS. INPUT POWER



INPUT POWER Pin (mW)



۲

CURRENT

TOTAL

(MA)

lcc1

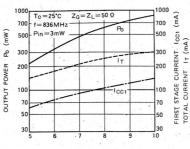
STAGE

FIRST

CURRENT IT (MA)

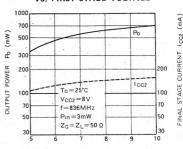
TOTAL

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE



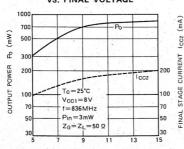
SUPPLY VOLTAGE VCC1 = VCC2 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE



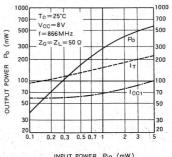
FIRST STAGE VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL CURRENT VS. FINAL VOLTAGE



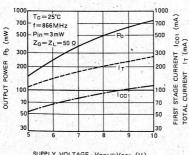
FINAL STAGE VOLTAGE Voca (V)

OUTPUT POWER, FIRST STAGE CURRENT, TOTAL CURRENT VS. INPUT POWER



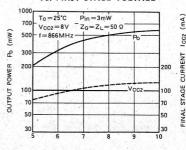
INPUT POWER Pin (mW)

OUTPUT POWER, FIRST STAGE CURRENT, FINAL STAGE CURRENT VS. SUPPLY VOLTAGE



SUPPLY VOLTAGE VCC1 = VCC2 (V)

OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE VOLTAGE



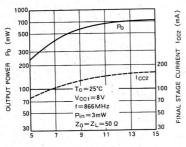
FIRST STAGE VOLTAGE VCC1 (V)



M57775

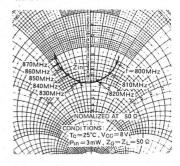
806~866MHz, 8V, 400mW, FM MOBILE RADIO

OUTPUT POWER, FINAL STAGE CURRENT VS. FINAL STAGE VOLTAGE



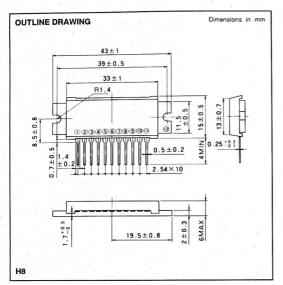
FINAL STAGE VOLTAGE VCC2 (V)

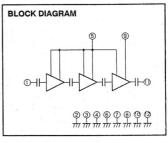
INPUT IMPEDANCE VS. FREQUENCY



M57776

889~915MHz, 8V, 300mW, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ⑤ VCC1 : 1st. DC SUPPLY ⑥ VCC2 : 2nd. DC SUPPLY ① PO : RF OUTPUT

234 GND 678 GND 0 GND

ØGND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

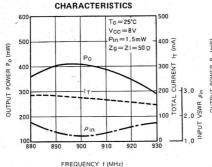
Symbol	Parameter	Conditions	Ratings	'Unit
Vccı	1st. DC supply		11	V .
Vcc2	2nd, DC supply		15	V
Icc	Total current		0.6	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 8V	5	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	0.6	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	℃

Symbol	D	Test conditions	Limits		1100
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		889	915	MHz
Po	Output power	Vcc1 = Vcc2 = 8V Pin = 1.5mW Zg = ZL = 50 Ω	300	40.343843	mW .
2fo	2nd. harmonic			- 30	dB
<i>p</i> in	Input VSWR		1.2.3713	2.8	
lτ	Total current	$V_{CC1} = V_{CC2} = 8V$, $P_0 = 0.3W(P_{in}: controlled)$ $Z_G = Z_L = 50\Omega$		250	mA
_	Load VSWR tolerance	Vcc1 = 8V, Vcc2 = 15V Po = 0.3W(Pin: controlled), Zg = 5QΩ Load VSWR=20:1(AII phase), 5sec.	No degradation		=

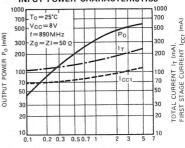


889~915MHz, 8V, 300mW, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA / OUTPUT POWER, TOTAL CURRENT, INPUT VSWR VS. FREQUENCY



OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

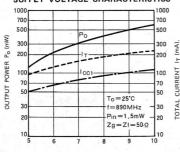


OUTPUT POWER, FINAL

CURRENT, VS. FIRST STAGE

CHARACTERISTICS

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



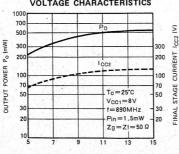
FIRST STAGE CURRENT ICC1 (MA)

1000 700 500 lcc2 300 300 CURRENT 200 200 POWER 1cc2 100 100 70 70 STAGE To=25°C DUTPUT 50 50 V_{CC2}=8V 30 f=890MHz Pin=1.5mW 20 20 $Zg = ZI = 50 \Omega$ 10 10

FIST STAGE VOLTAGE VCC1 (V)

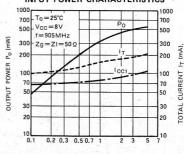
OUTPUT POWER, FINAL CURRENT VS. FINAL STAGE VOLTAGE CHARACTERISTICS

SUPPLY VOLTAGE VCC1 = VCC2 (V)



FINAL STAGE VOLTAGE VCC2 (V)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



INPUT POWER Pin (mW)

(mA)

CC1

CURRENT

IRST

(mA)

CC1

STAGE CURRENT

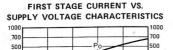
(mA)

F

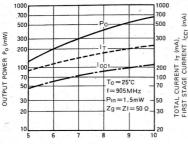
CURRENT

TOTAL FIRST

889~915MHz, 8V, 300mW, FM MOBILE RADIO

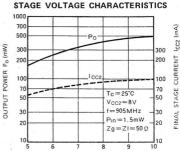


OUTPUT POWER, TOTAL CURRENT,



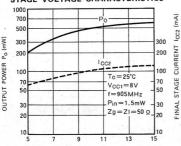
SUPPLY VOLTAGE V_{CC1} = V_{CC2} (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST



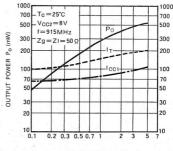
FIRST STAGE VOLTAGE VCC1 (V)

OUTPUT POWER. FINAL STAGE CURRENT FIAL STAGE VOLTAGE CHARACTERISTICS



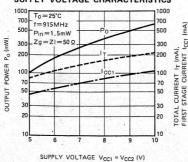
FINAL STAGE CURRENT ICC2 (V)

OUTPUT POWER, TOTAL CURRENT. FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

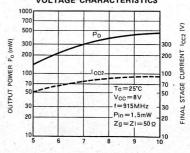


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE **VOLTAGE CHARACTERISTICS**

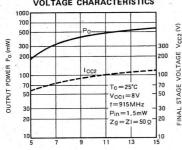


FIRST STAGE VOLTAGE VCC1 (V)



889~915MHz, 8V, 300mW, FM MOBILE RADIO

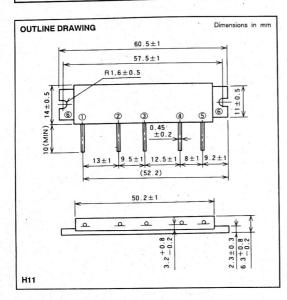
OUTPUT POWER, FINAL STAGE CURRENT VS. FINAL STAGE VOLTAGE CHARACTERISTICS

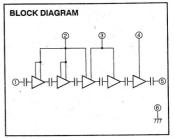


FINAL STAGE VOLTAGE VCC1 (V)

M57782

824~851MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

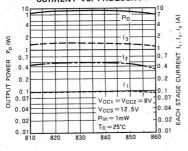
Symbol	Parameter	Conditions	Ratings	Unit
Vccı	1st. DC supply		9	V
Vcc2	2nd. DC supply		9	V
Vcc3	3rd, DC supply		17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8V$	7	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$. 10	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		- 40~110	°C

			Limits		11.30
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V Pin = 1mW ZG = ZL = 50 Ω	824	851	MHz
Po	Output power		7		W
ηт	Total efficiency		35	Maria de la	%
2fo	2nd, harmonic			- 30	dB
<i>p</i> in	Input VSWR			2.8	-
_	Load VSWR tolerance	Vcc1 = Vcc2 = 8V, Vcc3 = 15.2V Po = 7W (Pin : controlled), $Z_G = 50\Omega$ Load VSWR=20:1 (AII phase), 5sec.	No degradation		-



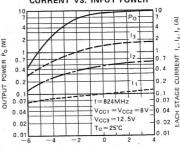
TYPICAL PERFORMANCE DATA

OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



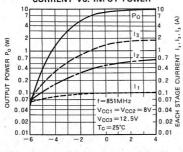
FREQUENCY f (MHz)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



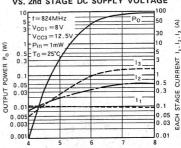
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



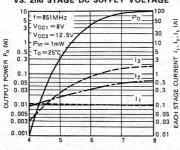
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



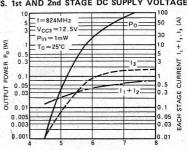
2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

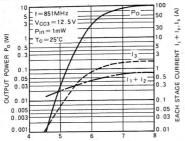
OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to the following consideration when designing a heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistances between junction of incorporated transistors and case are shown in the followings.
 - a) First stage transistor
 - $R_{th(j-c)1} = 20^{\circ} C/W (Typ.)$
 - b) Second stage transistor
 - $R_{th(j-c)2} = 17.5^{\circ}C/W (Typ.)$
 - c) Third stage transistor
 - $R_{th(i-c)3} = 16^{\circ}C/W (Typ.)$
 - d) Fourth stage transistor
 - $R_{th(j-c)4} = 9^{\circ}C/W \text{ (Typ.)}$
 - e) Final stage transistor
 - $R_{th(j-c)5} = 6.5^{\circ} C/W (Typ.)$
- (2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

 $P_O = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1mW$, $\eta_T = 35\%$ (minimum ratings),

I₁₊₂ = 0.781A (Total current from 1st stage to 4th stage)

I₃ = 1.1A (Current of 5th stage)

3 - 1.1A (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

• Junction temperature of the first stage transistor $T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th (j-c)1} + T_C^{(Note 1)}$ $= (8 \times 0.045 - 0.02 + 0.001) \times 20 + T_C$

 $= 6.8 + T_{C} (^{\circ}C)$

Note 1: Case temperature of device

Junction temperature of the second stage transistor
 T_{j2} = (V_{CC1} × I_{T2} - P_{O2} + P_{O1}) × R_{th(j-c)2} + T_C
 = (8 × 0.08 - 0.2 + 0.02) × 17.5 + T_C

Stage	V _{CC} (V)	I _T (mA)	Pin (mW)	Po (mW)
1st	8	45	@sz. 1	20
2nd	8	80	20	200
3rd	. 8	160	200	500
4 th	8	496	500	2000
5 th	12.5	1100	2000	7000

$$= 8.1 + T_{C} (^{\circ}C)$$

Junction temperature of the third stage transistor
 T_{j3} = (V_{CC2} x I_{T3} - P_{O3} + P_{O2}) x R_{th (j-c)3} + T_C

$$= (8 \times 0.16 - 0.5 + 0.2) \times 16 + T_C$$

- $= 15.7 + T_C (^{\circ}C)$
- Junction temperature of the fourth stage transistor

$$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_{C}$$

= $(8 \times 0.496 - 2 + 0.5) \times 9 + T_{C}$

$$= 22.2 + T_{C} (^{\circ}C)$$

Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$$

= $(12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$

$$= 56.9 + T_{C} (^{\circ}C)$$

2. Heat sink design

In thermal design of heat sink, keep the case temperature below $90^{\circ}C$ at output power P_{O} = 7W and ambient temperature = $60^{\circ}C$.

The thermal resistance $R_{th(c-a)}^{(Note 2)}$ of the heat sink to realize this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{(P_{\text{O}}/\eta_{\text{T}}) - P_{\text{O}} + P_{\text{in}}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31 \, (^{\circ}\text{C/W})$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$$T_{j1} = 97^{\circ}C$$
, $T_{j2} = 99^{\circ}C$, $T_{j3} = 106^{\circ}C$, $T_{j4} = 113^{\circ}C$, $T_{j5} = 147^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{C} = 90^{\circ}C$.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

$$T_{j1} = 67^{\circ}C$$
, $T_{j2} = 69^{\circ}C$ $T_{j3} = 76^{\circ}C$, $T_{j4} = 76^{\circ}C$, $T_{ir} = 117^{\circ}C$

As the maximum junction temperature of these incorporated transistors $T_{j_{max}}$ are 175°C, application under fully derated condition is ensured.

824~851MHz, 12.5V, 7W, FM MOBILE RADIO

GENERAL

Mitsubishi RF Power Modules for mobile radio applications have high reliability and good performance, as they are designed and manufactured under strict quality control. However, the reliability of semiconductor devices is remarkably affected by usage conditions such as circuit constructions, mounting method, environments, etc.. In order to keep high reliability and obtain good performance when using Mitsubishi RF Power Modules, the following important points concerning maximum ratings, handling, etc., should be noted before use.

1. MAXIMUM RATINGS

Maximum ratings of the RF Power Modules are defined by the "Absolute Maximum Ratings" shown in separate specification sheet. Maximum ratings should not be exceeded in any circumstances, even momentarily. If a device is operated in excess of the absolute maximum ratings, the device may immediately be degraded or destroyed. Futhermore, in designing an electronic circuit using RF power Modules, it is necessary to note that the maximum ratings of the devices should not be exceeded even if external conditions are changed.

2. NORMAL OPERATING VOLTAGE

Normal operating voltage is $12.5 \sim 13.8$ volts for Mitsubishi RF Power Modules, because they are designed for mobile radio applications. The regulated 9 volts is recommended for the base biasing voltage of the modules for linear power amplifiers (for SSB).

3. THERMAL DESIGN

In order to keep high reliability of the equipment, it is better to keep the module temperature low. The case temperature of the module, when operated standard conditions, is lower than 90°C under all severe ambient temperature, recommend normally 60°C .

4. MOUNTING and HANDLING

4-1 When the module is mounted on to a heat sink of a equipment, thermal compound to get good heat sinking should be applied between the module's fin and the heat sink. Following thermal compound for good heat sinking is recommended.

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4-2 When mounting a module to the circuit, do not apply excessive stress to the terminal leads or the fin. In particular, if there are some foreign objects between the module and the heat sink, or if there are some burrs or rising on the surface of the heat sink, it may happen that the substrate of the module will crack or break due to excessive stress from screwing the module on to the heat sink. Therefore, the surface of the heat sink in contact with the module must be as flat as possible.

When screwing a module to the heat sink, torque screw is recommended as 5 to 6kg-cm when using φ3mm screws.

4-3 For soldering, the major precautions are as follows:1) Flux;

Roles of flux are to remove oxidized layer on the

object, and prevent from oxidation during heating or lowering surface tension on the objects. Rosin flux, which is less corrosional and highly insulative, is recommended.

2) Soldering temperature;

The temperature of the lead soldering should be lower than 260°C and shorter than 10 seconds, or lower than 350°C and shorter than 3 seconds.

3) Cleaning after soldering;

The recommended solvent for cleaning the residual flux is the Ethyl Alcohol. Trichlene type solvents should not be used.

- 4.4 When the module is screwed after soldering the terminal leads to the circuit board, excessive stress is applied to the leads. Therefore, please solder the terminal leads to the circuit board after screwing the module to the heat sink.
- 4-5 If the module falls onto a hard surface, it will be damaged by mechanical shock and can no longer be used.
- 4-6 To obtain good stability and electrical performances, it is necessary to take precausions concerning the earth potential of the module. As the fin is the ground terminal, the fin should be connected to the ground of the set completly in RF condition.
- 4-7 The values of input VSWR and output VSWR of the module indicated in the specification sheet are guaranteed when the input and output leads are straight and these leads are connected to the load 50Ω within 10mm length. If the device is mounted under different conditions from these mentioneda above, the performances, such as output power and efficiency, may be degraded due to the impedance mismatch. In order to reform such an impedance mismatch, please set the additional matching circuits to get good impedance matching.

5. VOLTAGE SUPPLY

The modules have 2 or 3 terminals for DC power supply. If these terminals are combined without RFC (Radio Frequency Choke), or if each terminal is not bypassed with the condenser, parasitic oscillation occasionally may occured. Therefore, the DC Power Supply Terminals should be combined with RFC, and each terminal bypassed with the condensers ($10\mu F$ and 47000F in Parallel).

The first stage transistor of the module even for FM is operated in class AB. When excessively high voltage is applied to the first stage DC Power Supply Terminal, the first stage transistor may be destroyed due to current runaway. Therefore, the first stage supply voltage must be controlled, not exceeding 17 volts DC.

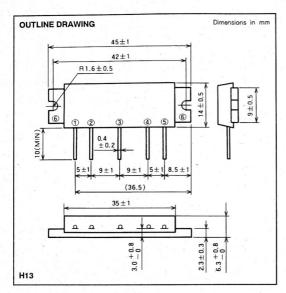
6. GUARANTEED CHARACTERISTICS

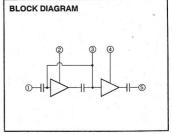
All the graphic characteristics illustrated in this catalog are typical examples. The characteristics of individual devices as specified in the tables of absolute maximum ratings and electrical characteristics are guaranteed under the specified conditions.



M57783L

135~160MHz, 7.5V, 7W, FM PORTABLE RADIO





PIN:

Pin : RF INPUT

②VCCI : 1st. DC SUPPLY

③VBB : BASE BIAS

④VCC2 : 2nd. DC SUPPLY

⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	S. andalta		9	V
VBB	Supply voltage		6	V
lcc	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

Symbol	Parameter	Test conditions	Limits		170.00
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		135	160	MHz
Po	Output power	Pin = 50mW	7		W
ηт	Total efficiency	V _{BB} = 5V V _{CC} = 7.5V	45		%
2fo	2nd. harmonic			- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
p in	Input VSWR			2.5	-
-	Load VSWR tolerance	Vcc = 13V, V _{BB} = 5V Po = 7W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Zc = 50 Ω	No degradation		<u>-</u>



3

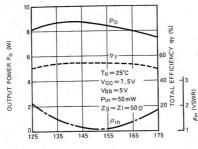
STAGE

3

135~160MHz, 7.5V, 7W, FM PORTABLE RADIO

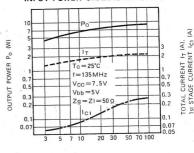
TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, $ho_{
m in}$ VS. FREQUENCY CHARACTERISTICS



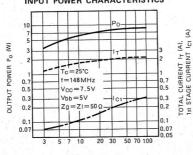
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



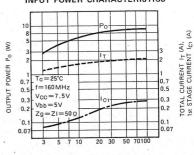
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



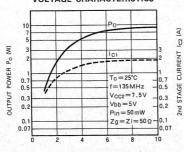
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



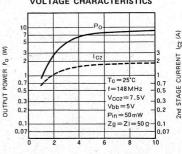
INPUT POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY **VOLTAGE CHARACTERISTICS**



1st STAGE SUPPLY VOLTAGE VCC1 (V)

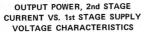
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY **VOLTAGE CHARACTERISTICS**

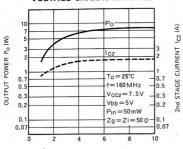


1st STAGE SUPPLY VOLTAGE VCC1 (V)

B

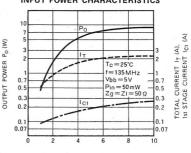
135~160MHz, 7.5V, 7W, FM PORTABLE RADIO





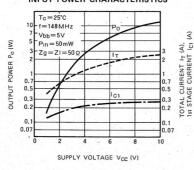
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

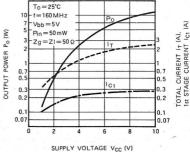


SUPPLY VOLTAGE VCC (V)

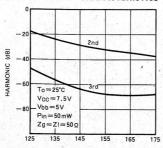
OUTPUT POWER, TOTAL CURRENT. 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



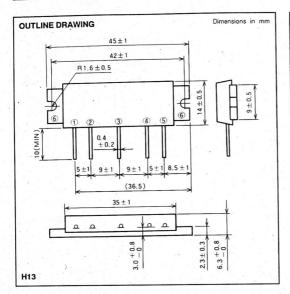
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

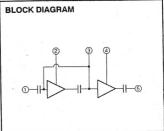


FREQUENCY f (MHz)

M57783H

150~175MHz, 7.5V, 7W, FM PORTABLE RADIO





PIN:

(1) Pin : RF INPUT (2) VCC1 : 1st. DC SUPPLY (3) VBB : BASE BIAS (4) VCC2 : 2nd. DC SUPPLY (5) PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc			9	V
VBB	Supply voltage		6	V
Icc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

dieta de	Parameter		Limits		Unit
Symbol		Test conditions	Min	Max	Unit
f	Frequency range		150	175	MHz
Po	Output power	P _{in} = 50mW V _{BB} = 5V V _{CC} = 7.5V	7	Title St. D	W
ητ	Total efficiency		45		%
2fo	2nd. harmonic			- 20	dB
3fo	3rd, harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
ρ in	Input VSWR		A CONTRACT OF	2.5	-
=	Load VSWR tolerance	Vcc = 13V, VBB = 5V Po = 7W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. ZG = 50 Ω	No degradation		-

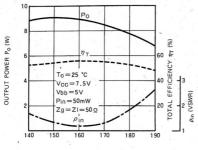
8

8

Ist STAGE CURRENT

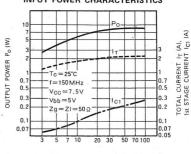
TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, ho_{in} VS. FREQUENCY CHARACTERISTICS



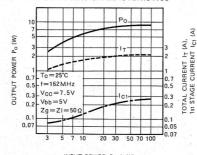
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT. 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



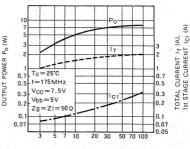
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



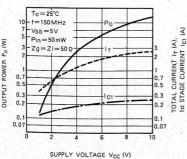
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

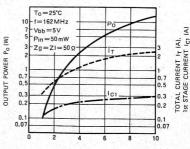


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

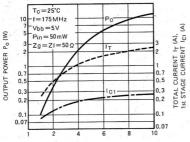


SUPPLY VOLTAGE VCC (V)

150~175MHz, 7.5V, 7W, FM PORTABLE RADIO

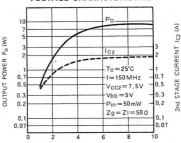
OUTPUT POWER, 2nd STAGE

OUTPUT POWER TOTAL CURRENT 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



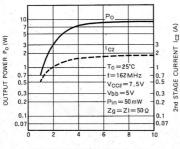
1st STAGE SUPPLY VOLTAGE VCC1 (V)

CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



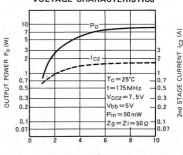
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



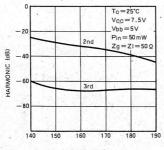
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



1st STAGE SUPPLY VOLTAGE VCC1 (V)

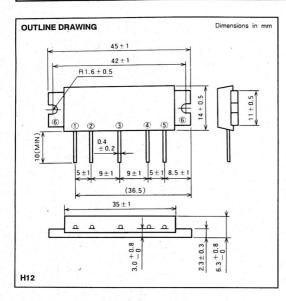
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

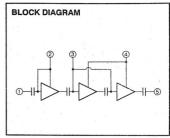


FREQUENCY f (MHz)

M57786UL

360~380MHz, 7.2V, 6W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY

③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

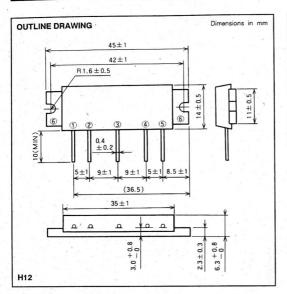
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	V _{BB} ≤ 5V	10	V
VBB	Supply Voltage	Vcc ≤ 7.2V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$.10	W
Tc(op)	Operation case temperature		30~110	℃
Tstg	Storage temperature		-40~110	°C

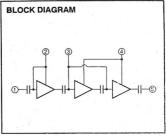
Symbol	Parameter	Test conditions	Limits		
		rest conditions	Min	Max	Unit
f	Frequency range		360	380	MHz
Po	Output power	Pin = 50mW	6	The state of	W
ηТ	Total efficiency	V _{BB} = 5V V _{CC} = 7.2V	38	1,00	%
2fo	2nd. harmonic		4 77 10 11 11	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	5.660=
_	Load VSWR tolerance	Vcc = 7.2V, VBB = 5V Po = 7W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Zc = 50 Ω	No degradation		-



M57786L

400~430MHz, 7.2V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

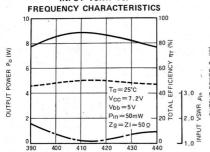
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1 1	V _{BB} ≤ 5V	10	V
Vвв	Supply voltage	Vcc ≤ 7.2V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	°C

Symbol	Parameter	Test conditions	Limits		Unit
		rest conditions	Min	Max	Unit
f	Frequency range		400	430	MHz
Po	Output power	$\begin{aligned} & & & & & & \\ & & & & & & \\ & & & & & $	7		W
ηт	Total efficiency		40		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic			- 30	dB
Pin	Input VSWR			2.5	
-	Load VSWR tolerance	Vcc = 7.2V, VBB = 5V Po = 7W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Zg = 50 Ω	No degradation		_

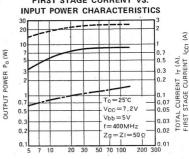
3

CCI





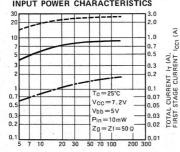
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



INPUT POWER Pin (mW)

FREQUENCY f (MHz)

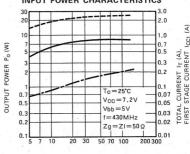
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER Po (W)

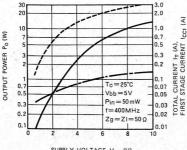
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



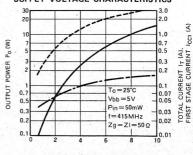
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

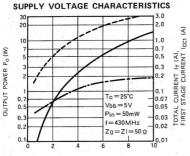


SUPPLY VOLTAGE VCC (V)



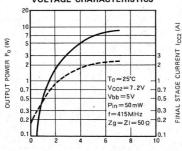
400~430MHz, 7.2V, 7W, FM PORTABLE RADIO

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



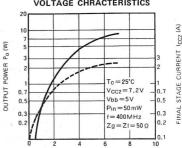
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



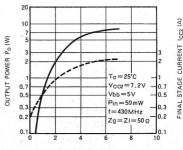
FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHRACTERISTICS



FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

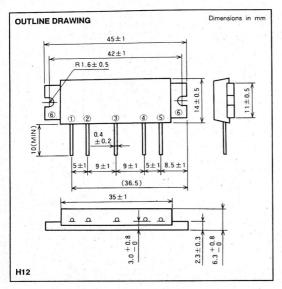
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

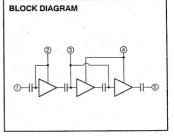


FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

M57786M

430~470MHz, 7.2V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

6GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0	V _{BB} ≤ 5V	10	V
V _{BB}	Supply voltage	Vcc ≦ 7.2V	6	V
lcc ·	Total current		4	: A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	1 ℃

Carlat	2	T - 1 - 101	Limits		11.5
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		430	470	MHz
Po	Output power	Pin = 50mW	7	1 1 10	W
ηт	Total efficiency	V _{BB} = 5V V _{CC} = 7.2V	40	State of the state	%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	V State of	- 30	dB
p in	Input VSWR			2.5	-
_	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 7.2\mbox{V, VBB} = 5\mbox{V} \\ \mbox{Po} = 7\mbox{W (Pin: controlled)} \\ \mbox{Load VSWR-20:1 (All phase), 2sec.} \\ \mbox{Ze} = 50\ \Omega \\ \end{array} $	No degradation		-



8

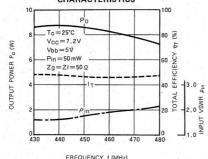
5

3

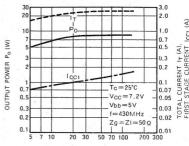
CC

430~470MHz, 7.2V, 7W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA **OUTPUT POWER, TOTAL EFFICIENCY** INPUT VSWR VS. FREQUENCY CHARACTERISTICS

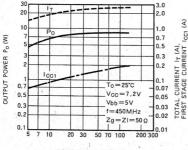


OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



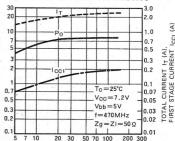
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



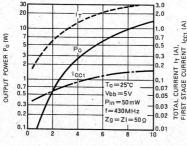
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

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3

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POWER

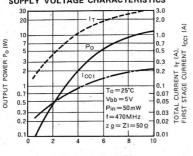
OUTPUT

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS 30 20 2.0 10 1.0 0.7 Po (W)

3 2 0.5 3 CURRENT 3 0.3 POWER 2 0.2 0.1 STAGE To=25°C 0.7 0.07 Vbb=5V 0.5 0.05 Pin=50 mW TOTAL FIRST (0.3 0.03 f=450MHz 0.2 0.02 $Z_Q = Z_I = 50 \Omega$ 0.1 0.01 2 10

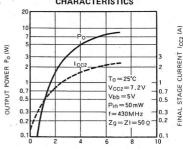
430~470MHz, 7.2V, 7W, FM PORTABLE RADIO

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



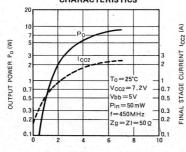
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



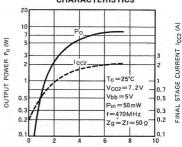
FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

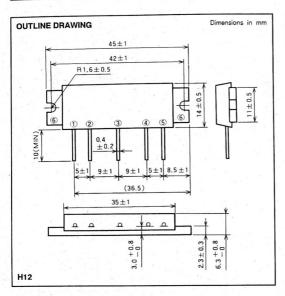
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

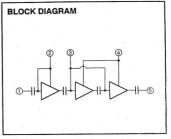


FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

M57786H

470~512MHz, 7.2V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : 'BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

GRND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc		V _{BB} ≤ 5V	10	V .
VBB	Supply voltage	Vcc ≤ 7.2V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	100	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	°C

C		Test conditions	Limits		Unit
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 50mW V _{8B} = 5V V _{CC} = 7.2V Z _G = Z _L = 50 Ω	470	512	MHz
Po	Output power		7	2 1	W
ητ	Total efficiency		40		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic			- 30	dB
p in	Input VSWR			2.5	-
_	Load VSWR tolerance	$\begin{array}{l} \text{Vcc} = 7.2\text{V, V}_{BB} = 5\text{V} \\ \text{Po} = 7\text{W (Pin: controlled)} \\ \text{Load VSWR-20:1 (All phase), 2sec.} \\ \text{Zg} = 50~\Omega \end{array}$	No degradation		_



3

CC

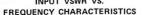
FIRST

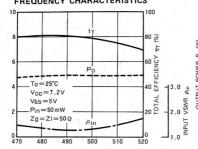
470~512MHz, 7.2V, 7W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY. INPUT VSWR VS.

Po (W)

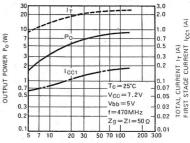
OUTPUT POWER





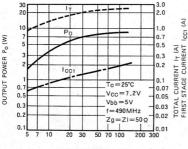
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



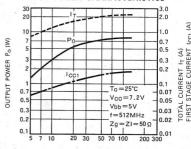
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



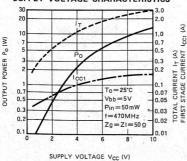
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

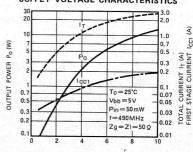


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



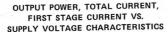
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

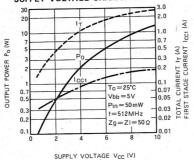


SUPPLY VOLTAGE VCC (V)

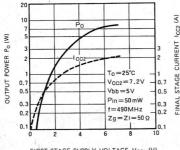


470~512MHz, 7.2V, 7W, FM PORTABLE RADIO



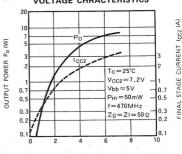


OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY **VOLTAGE CHARACTERISTICS**



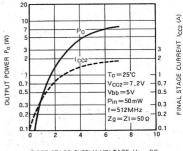
FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHRACTERISTICS



FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

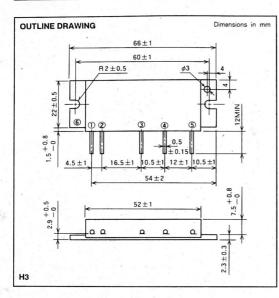
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY **VOLTAGE CHARACTERISTICS**

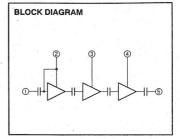


FIRST STAGE SUPPLY VOLTAGE VCC1 (V)

M57788L

400~430MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

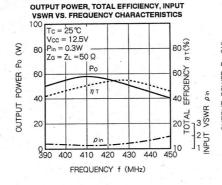
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	C. and the same		16	· V
Vcc2, 3	Supply voltage		17	V
lcc	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$. 0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	°C

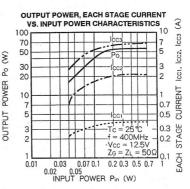
Symbol	Parameter	Test conditions	Limits		F 12.7
0,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	rafameter	rest conditions	Min	Max	Unit
f	Frequency range		400	430	MHz
Po	Output power	Pin = 0.3W	40		W
ηт	Total efficiency	Vcc = 12.5V	40		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	57	- 30	dB
Pin	Input VSWR	40 to 10 to		2.8	-
-	Load VSWR tolerance	Vcc = 15.2V, Po = 40W (Pin: controlled) Load VSWR-8.8:1 (AII phase), 2sec. Zc = 50 Ω	No degradation		w

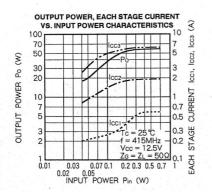


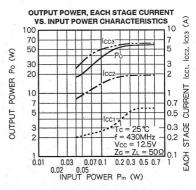
400~430MHz, 12.5V, 40W, FM MOBILE RADIO

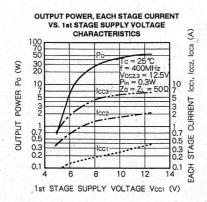
TYPICAL PERFORMANCE DATA

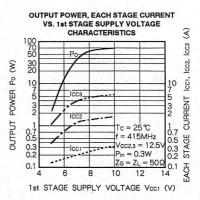






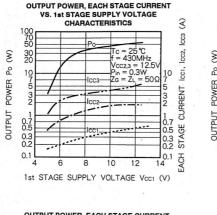


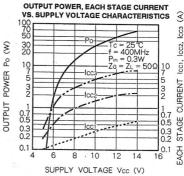


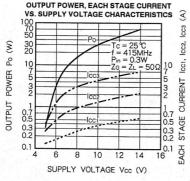


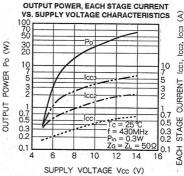
M57788L

400~430MHz, 12.5V, 40W, FM MOBILE RADIO



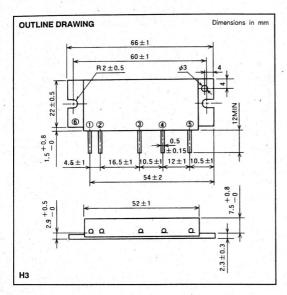


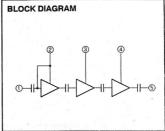




M57788M

430~450MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

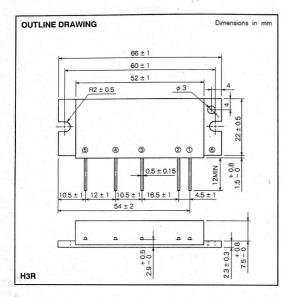
Symbol	Parameter	Conditions .	Ratings	Unit
Vccı	0 1		16	V
Vcc2, 3	Supply voltage		17	V
lcc .	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		-40~110	℃

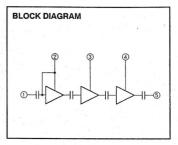
Symbol	Parameter	Test conditions	Limits		11.00
Symbol	Parameter	, lest conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power .	P _{in} = 0.4W Vcc = 12.5V Zg = Z _L = 50 Ω	40		W
ηт	Total efficiency		40		%
2fo	2nd. harmonic		Contraction of	- 30	dB
ρ in	Input VSWR			2.8	Y. E.
Ī	Load VSWR tolerance	V_{CC} = 15.2V, P_{O} = 40W (P_{In} : controlled) Load VSWR=8.8:1 (AII phase), 2sec. Z_{G} = 50 Ω	No degradation		-



M57788MR

430~450MHz, 13.5V, 45W, FM MOBILE RADIO





PIN: ①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY ④VCC3: 3rd. DC SUPPLY

⑤Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

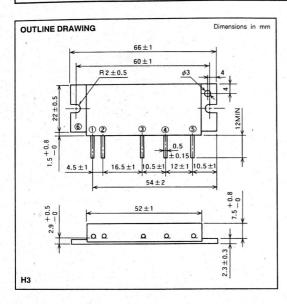
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	20

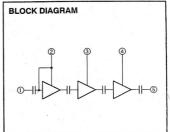
Symbol	Parameter	Test conditions	Limits		
		rest conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	Pin = 0.4W .Vcc = 13.5V Zc = ZL = 50 Ω	45	CAR SHOW STY	W
ηт	Total efficiency		40	Jan San S	%
2fo	2nd. harmonic			- 30	dB
Pin	Input VSWR		7 1	2.8	3. 3.
÷ ;	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V,} \\ \mbox{Po} = 40\mbox{W} \ (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load} \ \mbox{VSWR=8}. \ 8:1 \ (\mbox{AII} \ \mbox{phase}), \ 2\mbox{sec.} \\ \mbox{Zg} = 50 \ \Omega \\ \end{array} $	No degradation		-



M57788H

450~470MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:
① Pin : RF INPUT
② VCC1: 1st. DC SUPPLY

③VCC2: 2nd. DC SUPPLY ④VCC3: 3rd. DC SUPPLY ⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

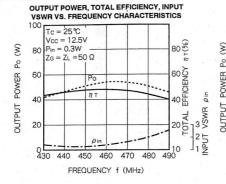
Symbol	Parameter	Conditions	Ratings	Unit
Vcc o			16	. V
Vcc2, 3	Supply voltage		17	V
lcc	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

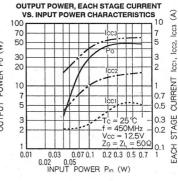
Symbol	Parameter	Test conditions	Limits		11.5
		lest conditions	Min	Max	Unit
f	Frequency range		450	470	MHz
Po	Output power	P _{in} = 0.3W Vcc = 12.5V Z _G = Z _L = 50 Ω	40		W
η T	Total efficiency		40	- 3. 1-1-1	%
2fo	2nd. harmonic			- 30	dB
<i>p</i> in	Input VSWR			2.8	
-	Load VSWR tolerance	Vcc = 15.2V, Po = 40W (Pin: controlled) Load VSWR=8.8:1 (AII phase), 2sec. Zc = 50 Ω	No degradation		_

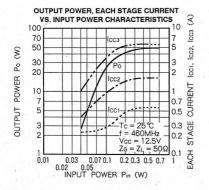


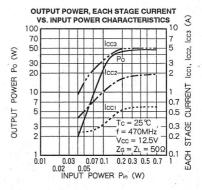
450~470MHz, 12.5V, 40W, FM MOBILE RADIO

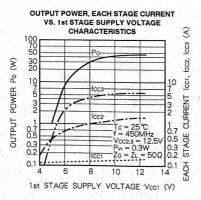
TYPICAL PERFORMANCE DATA

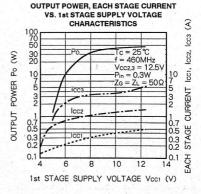






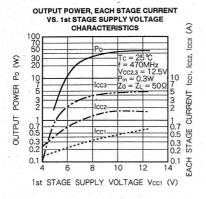


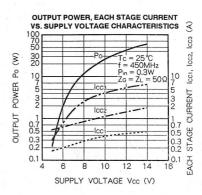


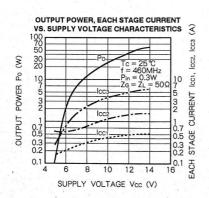


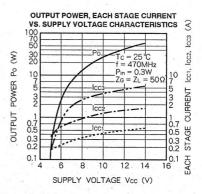
M57788H

450~470MHz, 12.5V, 40W, FM MOBILE RADIO





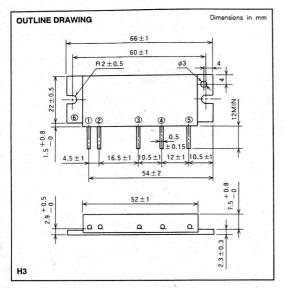


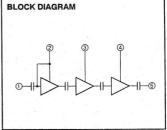


MITSUBISHI RF POWER MODULE

M57788UH

470~490MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

6 GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

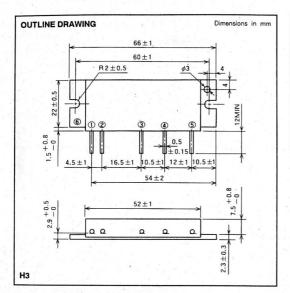
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	0 1 1		16	V	
Vcc2,3	Supply voltage		17	V	
lcc	Total current		12	Α	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W	
TC(OP)	Operation case temperature		- 30~110	°C	
Tstg	Storage temperature		- 40~110	℃	

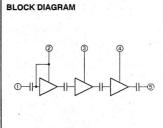
Symbol	Parameter	Test conditions	Limits		11111
			Min	Max	Unit
f	Frequency range	P _{in} = 0.3W Vcc = 12.5V Zc = ZL = 50 Ω	470	490	MHz
Po	Output power		40		W
η T	Total efficiency		40		%
2fo	2nd. harmonic			- 30	dB
ρ In	Input VSWR		A CHARLE	2.8	-
_	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 40\mbox{W} \ (\mbox{P}_{\mbox{in}}: \mbox{controlled}) \\ \mbox{Load VSWR-8. 8:1 (All phase), 2sec.} \\ \mbox{Zg} = 50\ \Omega \\ \end{array} $	No degradation		



M57788SH

490~512MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT
② Vcc1: 1st. DC SUPPLY
③ Vcc2: 2nd. DC SUPPLY
④ Vcc3: 3rd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise .noted)

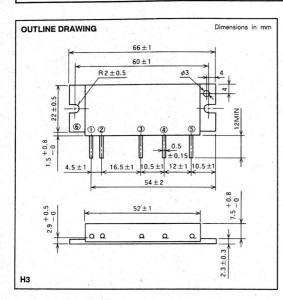
Symbol	Parameter	Conditions	Ratings	Unit
Vcc /	Supply voltage		16	V
Vcc2, 3	Supply Voltage	~ 1	17	V
lcc	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	℃

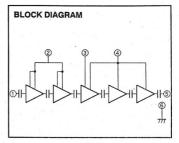
ELECTRICAL CHARACTERISTICS (T_C = 25 ℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		100
			Min	Max	Unit
f	Frequency range	P _{in} = 0.3W Vcc = 12.5V Z _G = Z _L = 50 Ω	490	512	MHz
Po	Output power		40	2 11 51	W
ηт	Total efficiency		40	4 P - 5	%
2fo	2nd. harmonic			- 30	dB
P In	Input VSWR		1 2 4 5	2.8	-
- 1	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \\ \mbox{Po} = 40\mbox{W} \ (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load} \ \mbox{VSWR=8}. \ 8:1 \ (\mbox{AII} \ \mbox{phase}), 2 \mbox{sec}. \\ \mbox{Zg} = 50 \ \Omega $	No degradation		-



890~915MHz, 12.5V, 12W, FM MOBILE RADIO





PIN:

①Pin: RF INPUT ②VCCI: 1st. DC SUPPLY ③VBB: BASE EIAS ④VCC2: 2nd. DC SUPPLY ⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1	1st. DC supply		13	V
VBB	Base bias		9	V
Vcc2	2nd. DC supply		17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 12.5V$	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		- 40~110	20

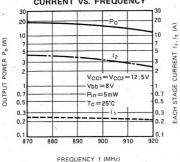
Symbol	Parameter	Test conditions	Limits		11.0
Cymbol	Farameter	lest conditions	Min	Max	Unit MHz W % dB
f	Frequency range		890	915	MHz
Po	Output power	Vcc1 = Vcc2 = 12.5, VBB = 8V	12	Control of the Contro	·W
ηт	Total efficiency	Pin = 5mW	30	7/91 S	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	1.00	-30	
Pin	Input VSWR			2.8	
=	Load VSWR tolerance	Vcc1=12.5V, Vcc2=15.2V, Vss=8V Po = 12W(Pin: controlled), Zo = 50Ω Load VSWR=20:1(AII phase), 5sec.	No degrad	lation	-



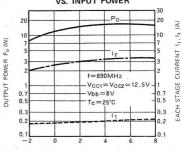
890~915MHz, 12.5V, 12W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY

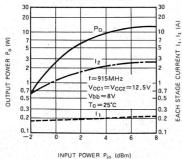


OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER

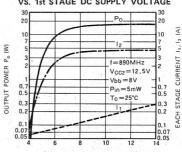


INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER

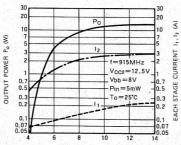


OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE DC SUPPLY VOLTAGE



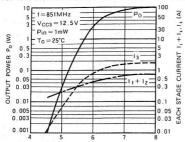
1st STAGE DC SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE DC SUPPLY VOLTAGE



1st STAGE DC SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to the following consideration when designing a heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistances between junction of incorporated transistors and case are shown in the followings.
 - a) First stage transistor

$$R_{th(j-c)1} = 20^{\circ}C/W (Typ.)$$

b) Second stage transistor

$$R_{th(j-c)2} = 17.5^{\circ} C/W (Typ.)$$

c) Third stage transistor

 $R_{th(i-c)3} = 15^{\circ} C/W (Typ.)$

Fourth stage transistor

 $R_{th(j-c)4} = 7.5^{\circ}C/W (Typ.)$

e) Final stage transistor

$$R_{th(j-c)5} = 3.75^{\circ} C/W (Typ.)$$

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$$P_O = 12W$$
, $V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$, $P_{in} = 5mW$, $\eta_T = 30\%$ (minimum ratings).

 ${\rm I}_1$ = 0.23A (Total current from 1st stage to 2nd stage) ${\rm I}_2$ = 2.97A (Total current from 3rd stage to 5th stage) The conditions at standard operation for each stage transistors are shown in Table 1.

Junction temperature of the first stage transistor
 Ti1 = (VCC1 x IT1 - PO1 + PI0) x Rth/(-011 + TC(N))

$$\begin{split} T_{j1} &= (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(Note 1)} \\ &= (12.5 \times 0.06 - 0.02 + 0.005) \times 20 + T_{C} \\ &= 14.6 + T_{C}^{(O)} \end{split}$$

Note 1: Case temperature of device

Junction temperature of the second stage transistor
 T_{j2} = (V_{CC1} x I₇₂ - P_{O2} + P_{O1}) x R_{th(j-c)2} + T_C
 = (12.5 x 0.17 - 0.4 + 0.03) x 17.5 + T_C
 = 30.7 + T_C (°C)

Table 1: The conditions at standard operation

Stage	V _{CC}	I _T (mA)	Pin (mW)	Po (mW)
1st	12.5	60	5	30
2nd	12.5	170	30	400
3rd	12,5	280	400	1300
4th	12.5	770	1300	4800
5th	12.5	1920	4800	12000

Junction temperature of the third stage transistor

$$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_{C}$$

= (12.5 × 0.28 – 1.3 + 0.4) × 15 + T_{C}
= 39.0 + T_{C} (°C)

Junction temperature of the fourth stage transistor

$$\begin{split} T_{j4} &= (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_{C} \\ &= (12.5 \times 0.77 - 4.8 + 1.3) \times 7.5 + T_{C} \\ &= 45.9 + T_{C} (^{\circ}C) \end{split}$$

Junction temperature of the final stage transistor

$$T_{j6} = \{V_{CC3} \times I_{T5} - P_{O5} + P_{O4}\} \times R_{th\{j-c\}5} + T_{C}$$

= $\{12.5 \times 1.92 - 12 + 4.8\} \times 3.75 + T_{C}$
= $63.0 + T_{C}$ (°C)

2. Heating sink design

In thermal design of heat sink, keep the case temperature below $90^{\circ}C$ at output power $P_{O}=12W$ and ambient temperature = $60^{\circ}C$.

The thermal resistance $R_{th(c-a)}^{(Note 2)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_{C} - T_{a}}{(P_{O}/\eta_{T}) - P_{P} + P_{in}} = \frac{90 - 60}{(12/0.3 - 12 + 0.001)}$$
$$= 1.00 (^{\circ}C/W)$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$$T_{j1} = 105^{\circ}C$$
, $T_{j2} = 121^{\circ}C$, $T_{j3} = 129^{\circ}C$, $T_{j4} = 136^{\circ}C$, $T_{j5} = 153^{\circ}C$ at $T_a = 60^{\circ}C$, $T_C = 90^{\circ}C$.

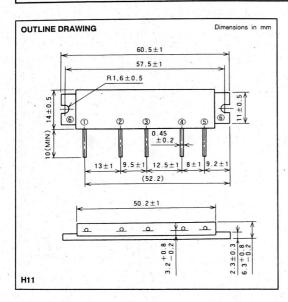
Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become:

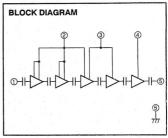
$$T_{j1} = 75^{\circ}C$$
, $T_{j2} = 91^{\circ}C$, $T_{j3} = 99^{\circ}C$, $T_{j4} = 106^{\circ}C$, $T_{in} = 123^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 153° C, application under fully derated condition is ensured.

M57791

890~915MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

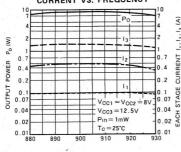
Symbol	Parameter	Conditions	Ratings	Unit
Vccı	1st. DC supply		9	V
Vcc2	2nd. DC supply		9	V
Vccз	3rd. DC supply		17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8V$	7	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	2

Symbol	Parameter	Test conditions	Limits		11-1
Cyllibol	Faranteter	Test conditions	Min	Max	Unit
f	Frequency range		890	915	MHz
Po	Output power	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V	7	110 100 100 1	W
ηт	Total efficiency	Pin = 1mW	35	545 T. S.	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
<i>P</i> In	Input VSWR			2.8	-
-	Load VSWR tolerance	Vcc1 = Vcc2 = 8V, Vcc3 = 15.2V Po = 7W (Pin : controlled), Zc = 50Ω Load VSWR=20:1 (All phase), 5sec.	No degrad	lation	-



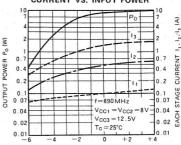
TYPICAL PERFORMANCE DATA

OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



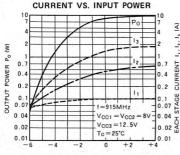
FREQUENCY f (MHz)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



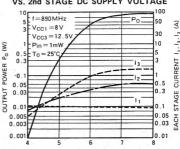
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE



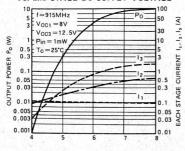
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



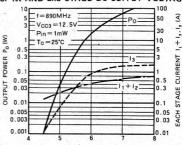
2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

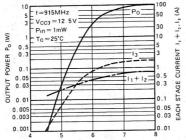
OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)

DESIGN CONSIDERATION OF HEAT RADIA-TION

Please refer to the following consideration when designing

1. Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.
 - First stage transistor

 $R_{th(j-c)1} = 20^{\circ}C/W (Typ.)$

h) Second stage transistor

 $R_{th(j-c)2} = 17.5^{\circ}C/W (Typ.)$

Third stage transistor

 $R_{th(j-c)3} = 16^{\circ}C/W (Typ.)$

Fourth stage transistor

 $R_{th(j-c)4} = 9^{\circ}C/W (Typ.)$

Final stage transistor

 $R_{th(j-c)5} = 6.5^{\circ}C/W \text{ (Typ.)}$

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$$P_{O} = 7W$$
, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1$ mW, $\eta_{T} = 35\%$ (minimum ratings),

I₁₊₂ = 0.781A (Total current from 1st stage to 4th

 $I_3 = 1.1A$ (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(Note 1)}$$

$$= (8 \times 0.045 - 0.02 + 0.001) \times 20 + T_{C}$$

 $= 6.8 + T_{C} (^{\circ}C)$

Note 1: Case temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$

= $(8 \times 0.08 - 0.2 + 0.02) \times 17.5 + T_C$

Stage	Vcc (V)	(mA)	Pin (mW)	Po (mW)
1st	8	45	1	20
2nd	8	80	20	200
3rd	8	160	200	500
4 th	8	496	500	2000
5 th	12.5	1100	2000	7000

$$= 8.1 + T_{C} (^{\circ}C)$$

· Junction temperature of the third stage transistor $T_{i3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_{C}$

$$= (8 \times 0.16 - 0.5 + 0.2) \times 16 + T_{C}$$

- $= 15.7 + T_{C} (^{\circ}C)$
- Junction temperature of the fourth stage transistor $T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_{C}$

$$= (8 \times 0.496 - 2 + 0.5) \times 9 + T_{C}$$

- = 22.2 + T_C (°C)
- Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$$

= $(12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$

$$= 56.9 + T_{C} (^{\circ}C)$$

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power Po = 7W and ambient temperature = 60°C.

The thermal resistance R_{th(c-a)} (Note 2) of the heat sink to realize this:

$$R_{th (c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31 \, (^{\circ}C/W)$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$$T_{j1} = 97^{\circ}C$$
, $T_{j2} = 99^{\circ}C$, $T_{j3} = 106^{\circ}C$, $T_{j4} = 113^{\circ}C$, $T_{j5} = 147^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{C} = 90^{\circ}C$.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

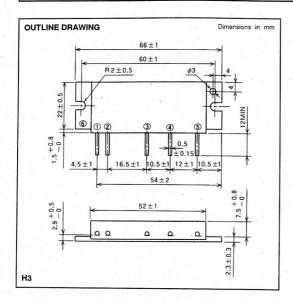
$$T_{j1} = 67^{\circ}C$$
, $T_{j2} = 69^{\circ}C$ $T_{j3} = 76^{\circ}C$, $T_{j4} = 76^{\circ}C$, $T_{i5} = 117^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{J max} are 175°C, application under fully derated condition is ensured.



M57792

806~870MHz, 13.5V, 20W, FM MOBILE RADIO



PIN:
①Pin::RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO::RF OUTPUT
⑥GND::FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1	1st. DC supply		14	V
Vcc2	2nd. DC supply		17	V
Vccз	3rd. DC supply	Erro de la colonia de la c	17	V
lcc	Total current	Z _G = Z _L = 50 Ω	7	V .
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 12.5V	0.8	W
Po(max)	Output power	Zg = ZL = 50 Ω	30	W
Tc(op)	Operation case temperature	Zg = ZL = 50 Q	-30~110	9°
Tstg	Storage temperature		-40~110	20

Symbol	Parameter	Test conditions	Lir	nits	
•	46) A. Ma/ 6 you 248) M. M. Mac C. m	rest conditions	Min	Max	Unit
f to the second	Frequency range		806	870	MHz
Po	Output power	Vcc1 = Vcc2 = Vcc3 = 13.5V Pin = 0.4W Zg = ZL = 50 Ω	20	0,0	W
ηT	Total efficiency		30	100	-
2fo	2nd, harmonic		30		%
Pin	Input VSWR	20 ZL 00 X		- 30	dB
	miput vovii			2.8	-
-	Load VSWR tolerance	Vcc1 = 13.5V, Vcc2 = Vcc3 = 15.5V Po = 20W (Pin: controlled), Zc = 50 Ω Load VSWR=20:1 (All phase), 5sec.	No degrad	ation	-

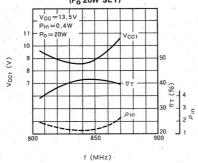


(A)

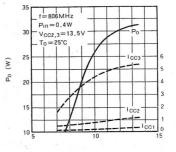
(A)

TYPICAL PERFORMANCE DATA

 V_{CC1} , η_T , ρ_{in} CHARACTERISTIC (P_0 20W SET)

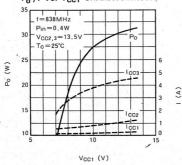


Po , I VS. VCC1 CHARACTERISTIC

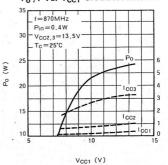


Vcc1 (V)

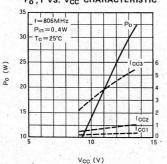
Po , I VS. VCC1 CHARACTERISTIC



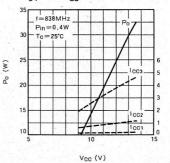
Po , I VS. VCC1 CHARACTERISTIC



Po , I VS. VCC CHARACTERISTIC

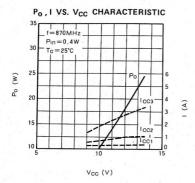


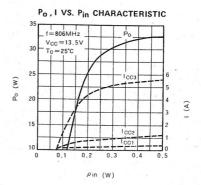
Po , I VS. VCC CHARACTERISTIC

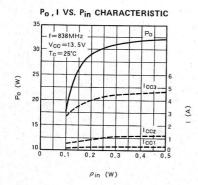


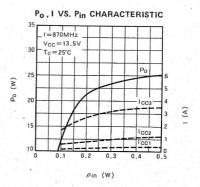
8

MITSUBISHI ELECTRIC (A)









806~870MHz, 13.5V, 20W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operaton.

- (1) Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

 $R_{th(j-c)1} = 15^{\circ}C/W \text{ (Typ.)}$

- b) Second stage transistor
 - $R_{th(j-c)2} = 3^{\circ}C/W \text{ (Typ.)}$
- c) Final stage transistor

 $R_{th(j-c)3} = 1.87^{\circ}C/W \text{ (Typ.)}$

- (2) Junction temperature of incorporated transistors at standard operation.
 - · Conditions for standard operation.

 $P_{O} = 20W$, $V_{CC} = 13.5V$, $P_{In} = 0.4W$, $\eta_{T} = 30\%$ (minimum rating), $P_{O1}^{(Note\ 1)} = 3W$, $P_{O2}(2) = 10W$, $I_{T} = 4.9A$ ($I_{T1}^{(3)} = 0.4A$, $I_{T2}^{(4)} = 1.4A$, $I_{T3}^{(5)} = 3.1A$)

Note 1: Output power of the first stage transistor

- Note 2: Output power of the second stage transistor
- Note 3: Circuit current of the first stage transistor
- Note 4: Circuit current of the second stage transistor
- Note 5: Circuit current of the final stage transisotr
- Junction temperature of the first stage transistor
 T_{j1} = (V_{CC} x I_{T1} P_{O1} + P_{In}) x R_{th (j-c)1} + T_C (6)
 = (13.5 x 0.4 3 + 0.4) x 15 + T_C

 $= 42 + T_C (^{\circ}C)$

Note 6: Package temperature of device

- Junction temperature of the second stage transistor $T_{j2} = V_{CC} \times I_{T2} P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_{C}$ $= (13.5 \times 1.4 10 + 3) \times 3 + T_{C}$
 - $= 35.7 + T_C (^{\circ}C)$
- Junction temperature of the final stage transistor $T_{j3} = (V_{CC} \times I_{T3} P_O + P_{O2}) \times R_{th(j-c)3} + T_C$ $= (13.5 \times 3.1 20 + 10) \times 1.87 + T_C$
 - = 59.6 + T_C (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60^{\circ}\text{C}$) and at the output power of 20W below 90°C .

The thermal resistance $R_{th(c-a)}^{(7)}$ of the heat sink to realize this:

$$R_{\text{th (c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{(P_{\text{O}}/\eta_{\text{T}}) - P_{\text{O}} + P_{\text{in}}} = \frac{90 - 60}{(20/0.3) - 20 + 0.4}$$
$$= 0.637 \, (^{\circ}\text{C/W})$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$$T_{j1} = 132^{\circ}C$$
, $T_{j2} = 125.7^{\circ}C$, $T_{j3} = 149.6^{\circ}C$ at $T_a = 60^{\circ}C$, $T_C = 90^{\circ}C$.

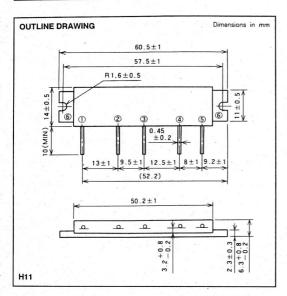
In the annual average of ambient temperature is 30°C,

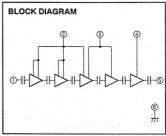
$$T_{j1} = 102^{\circ}C$$
, $T_{j2} = 95.7^{\circ}C$, $T_{j3} = 119.6^{\circ}C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175° C, application under fully derated condition is ensured.

M57793

903~905MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY

③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

GRND : FIN

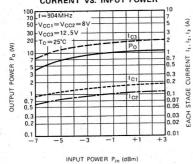
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vccı	1st. DC supply		9	V
Vcc2	2nd. DC supply		9	V
Vccз	3rd. DC supply		. 17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8V$	7	mW.
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
TC(OP)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	20

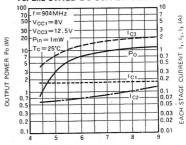
Symbol	Parameter	Test conditions	Limits		There
Cymbol	Farameter	Test conditions	Min	Max	Unit MHz W % dB
f	Frequency range		903	905	MHz
Po	Output power	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V	7	The state of	W
ηт	Total efficiency	Pin = 1mW	35	Transfer of	%
2fo	2nd. harmonic	Zg = ZL = 50 Ω	1000	- 30	
<i>p</i> in	Input VSWR			2.8	_
-	Load VSWR tolerance	Vcc1 = Vcc2 = 8V, Vcc3 = 15.2V Po = 7W (Pin : controlled), Z _G = 50Ω Load VSWR=20:1(AII phase), 5sec.	No degrad	dation	-



TYPICAL PERFORMANCE DATA OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER

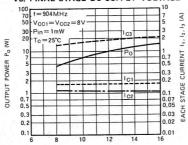


OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. FINAL STAGE DC SUPPLY VOLTAGE



FINAL STAGE DC SUPPLY VOLTAGE VCC3 (V)

APC Method

For Automatic Power Control (APC), we recommend the method by $\ensuremath{V_{\text{CC2}}}$ control.

Please regulate each stage supply voltage and input power as followings:

Symbol	Center value	Allowable changing value
Pin	1mW	0.7 ~ 3mW
V _{CC1}	8V	7 ~ 8.5V
V _{CC2}	3~8V	
V _{CC3}	13.5V	12.5V ~ 13.8V

903~905MHz, 12.5V, 7W, FM MOBILE RADIO

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.
 - a) First stage transistor

 $R_{th(j-c)1} = 20^{\circ} C/W (Typ.)$

- Second stage transistor
 - $R_{th(j-c)2} = 17.5^{\circ} C/W (Typ.)$
- Third stage transistor

 $R_{th(j-c)3} = 16^{\circ} C/W (Typ.)$

- Fourth stage transistor
 - $R_{th(j-c)4} = 9^{\circ}C/W (Typ.)$
- Final stage transistor $R_{th(j-c)5} = 6.5^{\circ}C/W$ (Typ.)
- (2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.
 - $P_{O} = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} =$ 1mW, η_T = 35% (minimum ratings),
 - I₁₊₂ = 0.781A (Total current from 1st stage to 4th stage)
 - $I_3 = 1.43A$ (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

Junction temperature of the first stage transistor

$$\begin{split} T_{j1} &= (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{\text{(Note 1)}} \\ &= (8 \times 0.05 - + 0.001) \times 20 + T_{C} \end{split}$$

 $= 7.6 + T_C (^{\circ}C)$

Note 1: Case temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$

 $= (8 \times 0.09 - 0.2 + 0.02) \times 17.5 + T_{C}$

 $= 9.5 + T_C (^{\circ}C)$

Junction temperature of the third stage transistor

$$T_{j3} = (V_{CC2} \times I_{Te} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_{C}$$

= $(8 \times 0.12 - 0.5 + 0.2) \times 16 + T_{C}$

 $= 11.6 + T_C (^{\circ}C)$

Junction temperature of the fourth stage transistor

$$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$$

 $= (12.5 \times 0.43 - 2 + 0.5) \times 9 + T_C$

= 34.9 + T_C (°C)

Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_{O5} + P_{O4}) \times R_{th(j-c)5} + T_{C}$$

= $(12.5 \times 1.0 - 7 + 2) \times 6.5 + T_{C}$

 $= 48.8 + T_C (^{\circ}C)$

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power Po = 7W and ambient temperature = 60°C.

Table 1: The conditions at standard operation

Stage	V _{CC}	I _T (mA)	Pin (mW)	Po (mW)
1st	8	50	1	20
2nd	. 8	90	20	200
3rd	8	120	200	500
4 th	8	430	500	2000
5 th	12.5	1000	2000	7000

The thermal resistance R_{th(c-a)} (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$$T_{j1} = 98^{\circ}C$$
, $T_{j2} = 100^{\circ}C$, $T_{j3} = 102^{\circ}C$, $T_{j4} = 125^{\circ}C$, $T_{j5} = 139^{\circ}C$ at $T_a = 60^{\circ}C$, $T_C = 90^{\circ}C$.

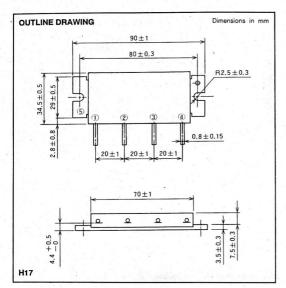
Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

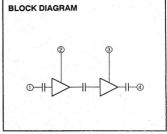
$$T_{j1} = 68^{\circ}C$$
, $T_{j2} = 70^{\circ}C$, $T_{j3} = 72^{\circ}C$, $T_{j4} = 95^{\circ}C$, $T_{j5} = 109^{\circ}C$

As the maximum junction temperature of these incorporated transistors Timax are 175°C, application under fully derated condition is ensured.

M67702

150~175MHz, 12.5V, 60W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

@Po : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = $25\,^{\circ}$ C unless otherwise noted)

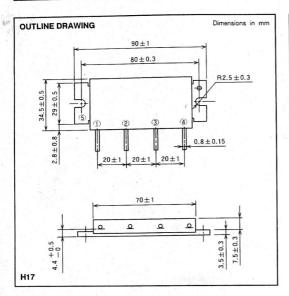
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		25	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	10	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	90	W
Tc(op)	Operation case temperature		- 30~110	20
Tstg	Storage temperature		-40~110	20

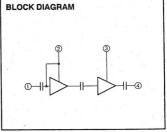
Symbol	Parameter	Test conditions	Limits		11-9
Cymbol	. Talametel	rest conditions	Min	Max	Unit
f	Frequency range		150	175	MHz
Po	Output power	P _{in} = 5W Vcc = 12.5V Z _G = Z _L = 50 Ω	60	Carlo and Carlo	W
ηТ	Total efficiency		40	500 1987	%
2fo	2nd. harmonic		1 22	- 30	dB
3fo	3rd. harmonic	2G - 2L - 50 Q	1 120	- 35	dB
<i>p</i> in	Input VSWR			2.8	-/
-	Load VSWR tolerance	$\label{eq:Vcc} \begin{array}{l} Vcc = 15.2V \\ Po = 60W \; (P_{in}: controlled) \\ Load \; VSWR=20:1 \; (All \; phase), 2sec. \\ Zg = 50 \; \Omega \end{array}$	No degradation		-



M67703M

430~450MHz, 12.5V, 45-50W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ PO : RF OUTPUT ⑤ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

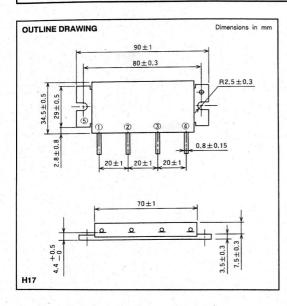
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		25	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	18	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	80-	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	℃

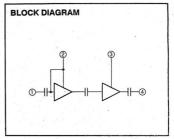
Symbol	D	Test conditions	Limits		1100
	Parameter	lest conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P _{in} = 10W Vcc = 12.5V	50	S. A. SHE	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
3fo	3rd. harmonic	26 - 2L - 50 k		- 35	dB
ρ in	Input VSWR			2.8	9.
-	Load VSWR tolerance	Vcc = 15.2V Po = 50W (Pin: controlled) Load VSWR=8.8:1(AII phase), 2sec. Zo = 50 Ω	No degradation		-



M67703H

450~470MHz, 12.5V, 45-50W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VCC2: 2nd. DC SUPPLY @Po : RF OUTPUT

GOND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

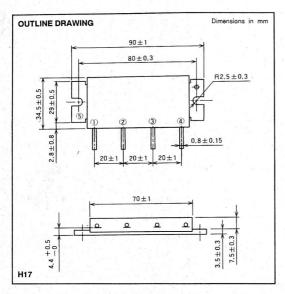
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		25	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	18	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	80	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		- 40~110	2°

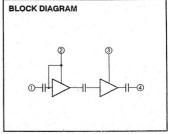
Symbol	Parameter	Test conditions	Lir		
Cymbol	i alametel	rest conditions	Min	Max	Unit
f	Frequency range		450	470	MHz
Po .	Output power	Pin = 10W	50		W
ηт	Total efficiency		40	100	%
2fo	2nd. harmonic	Vcc = 12.5V Ze = ZL = 50 Ω		- 30	dB
3fo	3rd. harmonic	2G = 2L = 50 \$2	J. P. C. Committee	- 35	dB
Pin	Input VSWR		1	2.8	
_	Load VSWR tolerance .	Vcc = 15.2V Po = 50W (Pin: controlled) Load VSWR-8.8:1(All phase), 2sec. Za = 50 Ω	No degradation 🦠		



M67703UH

470~490MHz, 12.5V, 45-50W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ PO : RF OUTPUT ⑤ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

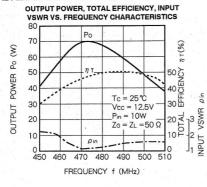
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	Supply voltage	F. 74-1.	17	V	
lcc	Total current	Exercise Williams and the property of	25	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	18	W	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	80	W	
Tc(op)	Operation case temperature		-30~110		
Tstg	Storage temperature		-40~110	℃	

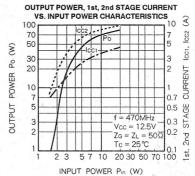
Symbol	Parameter	Test conditions	Lin	111.70	
Symbol	rarameter .	rest conditions	Min	Max	Unit
f	Frequency range		470	490	MHz
Po	Output power	P _{in} = 10W Vcc = 12.5V Z _G = Z _L = 50 Ω	50	Ser 4 (4.5 ft)	W
ηт	Total efficiency		40	11.54	%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic	7 20 - 2L - 30 sz		- 35	dB
Pin	Input VSWR			2.8	- 1
-	Load VSWR tolerance	$\label{eq:controlled} \begin{array}{l} \text{Vcc} = 15.2\text{V} \\ \text{Po} = 50\text{W} \text{ (Pin': controlled)} \\ \text{Load VSWR=8.8:1 (AII phase), 2sec.} \\ \text{Zg} = 50 \ \Omega \end{array}$	No degradation		_

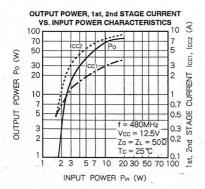


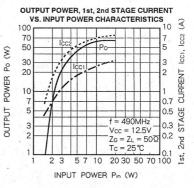
470~490MHz, 12.5V, 45-50W, FM MOBILE RADIO

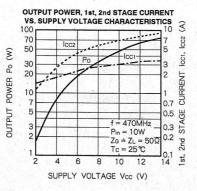
TYPICAL PERFORMANCE DATA

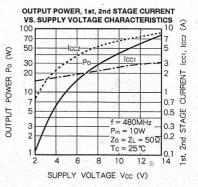






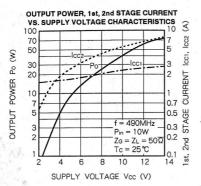


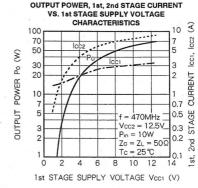


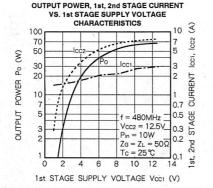


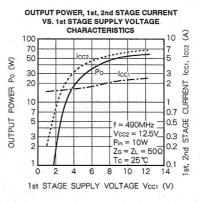
M67703UH

470~490MHz, 12.5V, 45-50W, FM MOBILE RADIO



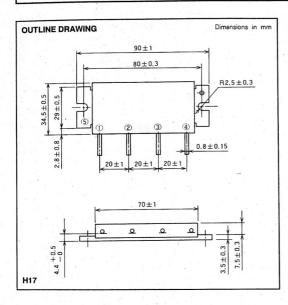


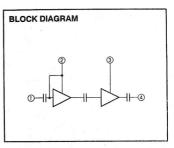




M67703SH

490~512MHz, 12.5V, 45-50W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ PO: RF OUTPUT
⑤ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

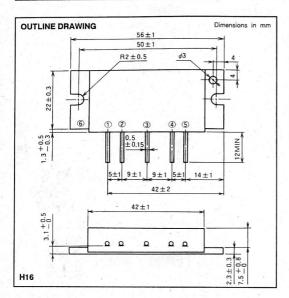
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		25	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	18	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	80	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	℃

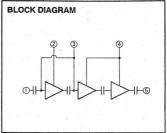
Symbol	D	Test conditions	Limits		11-74
Symbol	Parameter	lest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 10W Vcc = 12.5V Z _G = Z _L = 50 Ω	490	512	MHz
Po	Output power		50		W
ηΤ	Total efficiency		40		%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic	26 - 26 - 30 \$2		- 35	dB
ρ in	Input VSWR			2.8	
_	Load VSWR tolerance	Vcc = 15.2V $Po = 50W$ (Pin : controlled) Load VSWR=8.8:1 (AII phase), 2sec. $ZG = 50 Ω$	No degradation		-



M67704

142~175MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB : BASE BIAS
③ VCC2: 2nd. DC SUPPLY
⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply welter-		16	V
V _{BB}	Supply voltage		6	V
lcc	Total current		4	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω	40	mW
Po(max)	Output power	Z _G = Z _L = 50 Ω	20	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature	A Section of the sect	-40~110	%

Symbol	Parameter	Test conditions	Lir		
	Talametel	rest conditions	Min	Max	Unit
f	Frequency range		142	175	MHz
Po	Output power	Pin = 20mW	13	A. P. S. S. S.	W
ηт	Total efficiency	V _{BB} = 5V V _{CC} = 12.5V	40	Comments.	%
2fo	2nd. harmonic			- 20	,,,
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
<i>p</i> in	Input VSWR		A STATE OF THE	2.5	- A
-	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2\mbox{V}, \mbox{ VgB} = 5\mbox{V} \\ \mbox{Po} = 13\mbox{W} \mbox{ (Pin: controlled)} \\ \mbox{Load VSWR-20:1 (All phase), 2sec.} \\ \mbox{Zg} = 50\mbox{\Omega} \\ \end{array} $	No degradation		<u>-</u>



(A)

STAGE CURRENT

Ist

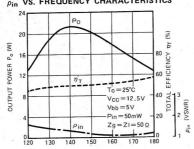
C1 (A)

STAGE CURRENT

st

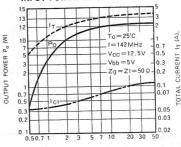
142~175MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY, ρin VS. FREQUENCY CHARACTERISTICS



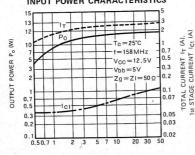
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



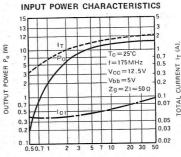
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



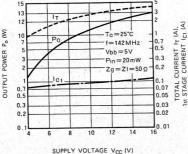
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS.



INPUT POWER Pin (mW)

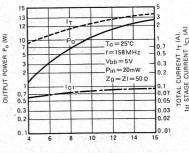
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



CURRENT STAGE st

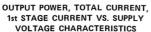
POWER DUTPUT 0.5 0.3 0.2

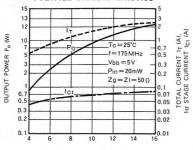
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY **VOLTAGE CHARACTERISTICS**



SUPPLY VOLTAGE VCC (V)

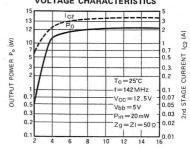
142~175MHz, 12.5V, 13W, FM MOBILE RADIO





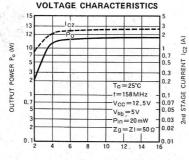
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



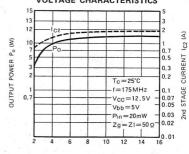
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY



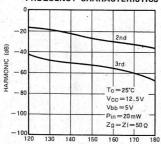
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



1st STAGE SUPPLY VOLTAGE VCC1 (V)

2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

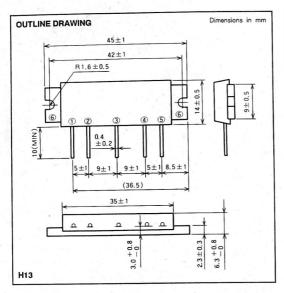


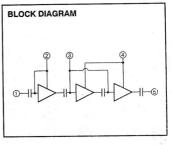
FREQUENCY f (MHz)



M67705UL

380~400MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

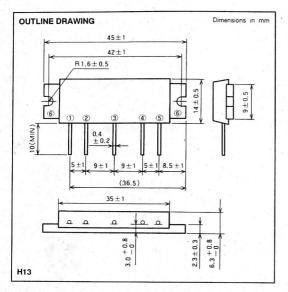
Symbol	Parameter	Conditions	Ratings	Unit
Vcc		V _{BB} ≤ 5V	13	· V
V _{BB}	Supply voltage	Vcc ≤ 9.6V	6	V
Icc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(OP)	Operation case temperature		30~110	℃
Tstg	Storage temperature		- 40~110	℃

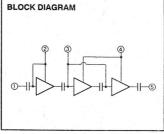
Symbol	Parameter	+	Limits		Unit
		Test conditions	Min	Max	Unit
f	Frequency range		380	400	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V V _{CC} = 9.6V	7	The State of	W
ηΤ	Total efficiency		40		%
2fo	2nd, harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	
	Load VSWR tolerance	Vcc = 9.6V, Vbb = 5V Po = 7W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Za = 50 Ω	No degradation		-



M67705L

400~430MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT @Vcc1: 1st. DC SUPPLY 3 VBB : BASE BIAS @VCC2: 2nd. DC SUPPLY (S) PO : RF OUTPUT (S) GND : FIN

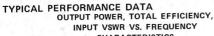
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

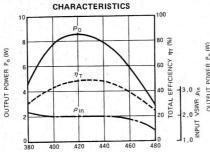
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	V _{BB} ≤ 5V	13	V
V _{BB}	Supply Voltage	Vcc ≤ 9.6V	6	V
lcc	Total current		4	Δ.
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature	Was also and the same of the same	- 40~110	2°

Symbol	Parameter	Test conditions	Limits		3000
		rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 20mW V _{BB} = 5V V _{CC} = 9.6V Z _G = Z _L = 50 Ω	400	430	MHz
Po	Output power		7		W
ηT	Total efficiency		40	3.00	%
2fo	2nd. harmonic		21.1	- 25	dB
3fo	3rd. harmonic			- 30	dB
P in	Input VSWR			2.5	UB -
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC} = 9.6V, \ V_{BB} = 5V \\ Po = 7W \ (P_{In}: controlled) \\ Load \ VSWR=20:1 \ (All \ phase), 2sec. \\ Z_G = 50 \ \Omega \end{array} $	No degradation		-



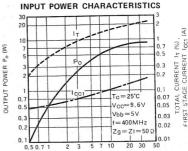
400~430MHz, 9.6V, 7W, FM PORTABLE RADIO





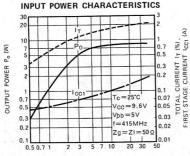
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



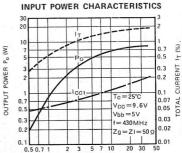
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS.



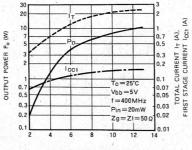
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



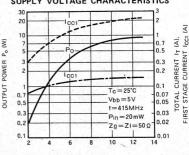
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

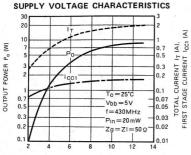


3

STAGE CURRENT ICC1

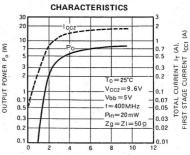
400~430MHz, 9.6V, 7W, FM PORTABLE RADIO

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



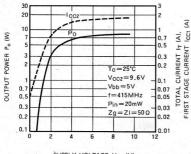
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY



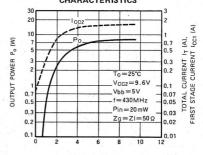
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

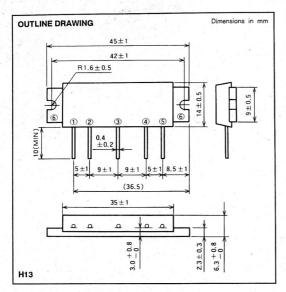
OUTPUT POWER, FIANL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

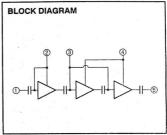


SUPPLY VOLTAGE VCC (V)

M67705M

430~470MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:
()Pin: RF INPUT
()VCC1: 1st. DC SUPPLY
()VBB: BASE BIAS
()VCC2: 2nd. DC SUPPLY
()PO: RF OUTPUT

6GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

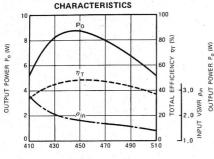
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1 1	V _{BB} ≤ 5V	13	V
V _{BB}	Supply voltage	Vcc ≤ 9.6V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	2
Tstg	Storage temperature		-40~110	℃

Symbol	Parameter	Test conditions	Limits		11.3
		lest conditions	Min	Max	Unit
f	Frequency range		430	470	MHz
Po	Output power	Pin = 20mW VBB = 5V Vcc = 9.6V	7	The second	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic		i av siled de	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	7 · = ·
-	Load VSWR tolerance	$ \begin{array}{l} \text{Vcc} = 9.6\text{V}, \; \text{VBB} = 5\text{V} \\ \text{Po} = 7\text{W} \; \left(\text{Pin}: \text{controlled}\right) \\ \text{Load VSWR} = 20:1 \; (\text{AII phase}), \; \text{2sec.} \\ \text{Ze} = 50 \; \Omega \\ \end{array} $	No degradation		-

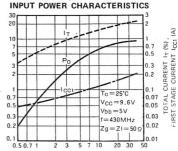


430~470MHz, 9.6V, 7W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHAPACTERISTICS

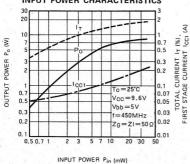


OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

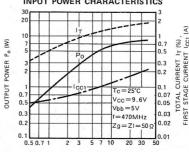


FREQUENCY f (MHz) INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

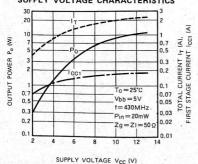


OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

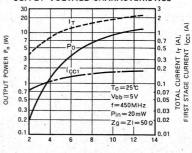


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



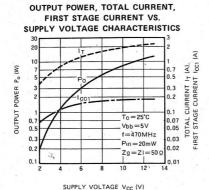
OUTPUT POWER, TOTAL CURRENT,
FIRST STAGE CURRENT VS.
SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

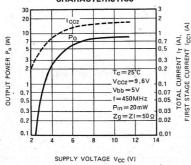
M67705M

430~470MHz, 9.6V, 7W, FM PORTABLE RADIO

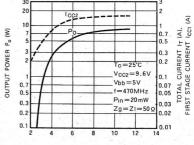


OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY CHARACTERISTICS 20 8 10 (A), ŝ 0.7 0.5 ۵ Ŀ STAGE CURRENT 0.3 3 POWER $T_C = 25^{\circ}C$ 2 0.2 V_{CC2}=9.6V Vbb = 5V0,1 DUTPUT f=430MHz 0.7 0.07 $Pin = 20 \, mW$ 0.5 0.05 $Zg = ZI = 50 \Omega$ 0.3 0.03 0.02 0.2 0.1 0.01 4 10

OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



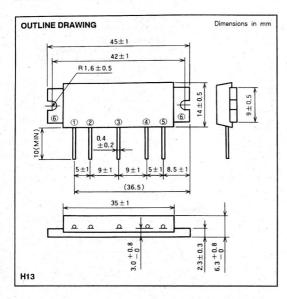
SUPPLY VOLTAGE VCC (V)

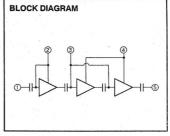


SUPPLY VOLTAGE VCC (V)

M67705H

470~512MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2: 2nd. DC SUPPLY
⑤ PO : RF OUTPUT

6 GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

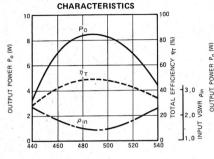
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Cusality valence	V _{BB} ≤ 5V	13	V
VBB	Supply voltage	Vcc ≤ 9.6V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

Symbol	Parameter	Test conditions	Lir	Limits	
Cymbol		rest conditions	Min	Max	Unit
f	Frequency range		470	512	MHz
Po	Output power	Pin = 20mW	7	1769 175	W
ηT	Total efficiency	V _{BB} = 5V. V _{CC} = 9.6V	40	Statement 12	%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	
-	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 9.6 \mbox{V, VBB} = 5 \mbox{V} \\ \mbox{Po} = 7 \mbox{W (Pin : controlled)} \\ \mbox{Load VSWR-20:1 (All phase), 2sec.} \\ \mbox{Zc} = 50 \mbox{\Omega} \\ \end{array} $	No degradation		-

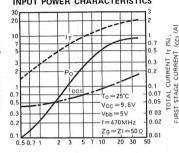


470~512MHz, 9.6V, 7W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY

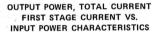


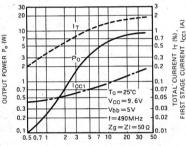
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



INPUT POWER Pin (mW)

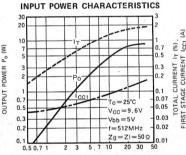
FREQUENCY f (MHz)





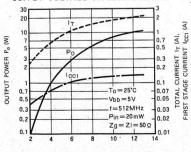
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS.



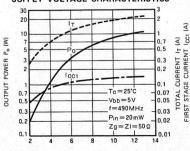
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

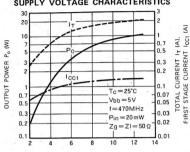


· SUPPLY VOLTAGE VCC (V)



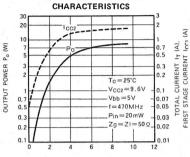
470~512MHz, 9.6V, 7W, FM PORTABLE RADIO

OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



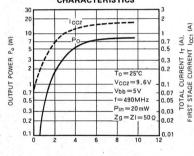
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY



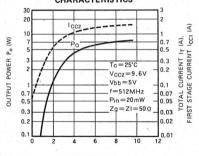
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



SUPPLY VOLTAGE VCC (V)

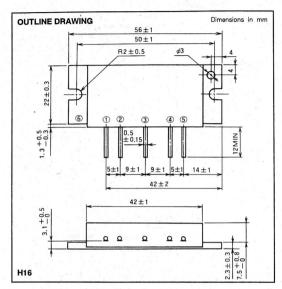
OUTPUT POWER, FIANL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

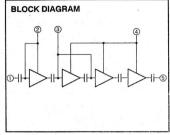


SUPPLY VOLTAGE VCC (V)

M67709L

350~390MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③VBB : BASE BIAS ③VCC2 : 2nd, DC SUPPLY

(5) PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

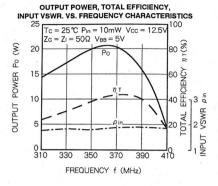
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Cuash ushan	V _{BB} ≤ 5V	16	V .
VBB	Supply voltage	Vcc ≤ 12.5V	6	V
lcc	Total current		5	Α.
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	20	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	°C

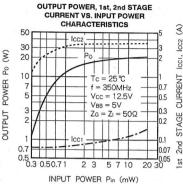
Symbol	Parameter	Test conditions	Limits		11-26
Cyllibol		rest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 10mW Vcc1, 2 = 12.5V VbB = 5V Zg = ZL = 50 Ω	350	390	MHz
Po	Output power		13		W
ηт	Total efficiency		35		%
2fo	2nd. harmonic			- 30	5000
3fo	3rd. harmonic		STORY TO	- 35	dB
p in	Input VSWR			2.8	W / -
.=	Load VSWR tolerance	Vcc1=12.5V, Vcc2=15.2V, Vaa=5V Po=13W (P _{in} : controlled) Load VSWR-20:1(All phase), 2sec. Za=50Q	No degradation		-

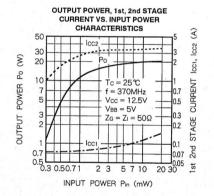


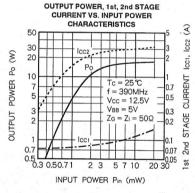
350~390MHz, 12.5V, 13W, FM MOBILE RADIO

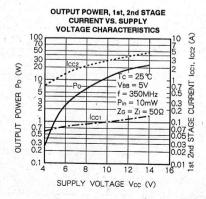
TYPICAL PERFORMANCE DATA

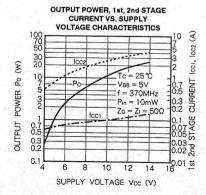






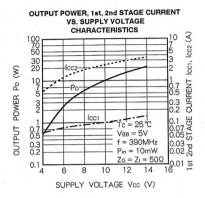


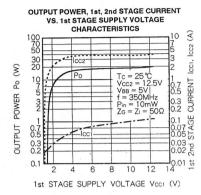


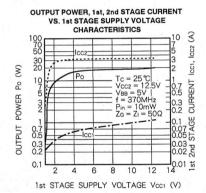


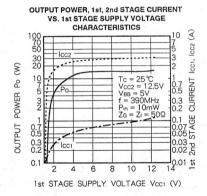
M67709L

350~390MHz, 12.5V, 13W, FM MOBILE RADIO

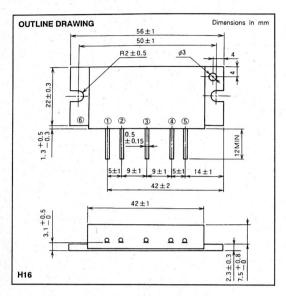


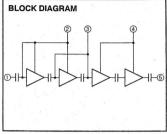






430~470MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB: BASE BIAS
③ VCC2: 2AG. DC SUPPLY
⑤ PO: RF OUTPUT

@GND : FIN

18 18

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

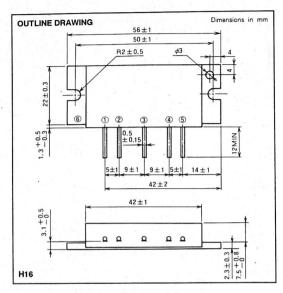
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	V _{BB} ≤ 5V	16	V
VBB	Supply Voltage	Vcc ≤ 12.5V	6	. V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	20	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	°C

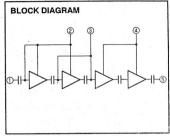
Symbol	Parameter	Test conditions	Limits		
WALL ST	, and the terminates	rest conditions	Min	Max	Unit
f	Frequency range		430	470	MHz
Po	Output power	Pin = 10mW	13	100 100 100	W
ηт	Total efficiency	Vcc1, 2 = 12.5V	35		%
2fo	2nd. harmonic	V _{BB} = 5V	Y - N 75	- 30	and the
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 35	dB
<i>p</i> in	Input VSWR		Value Alt	2.8	-
-	Load VSWR tolerance	$ \begin{array}{llllllllllllllllllllllllllllllllllll$			-



M67709M

390~430MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS ③ VCC2 : 2nd. DC SUPPLY

⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

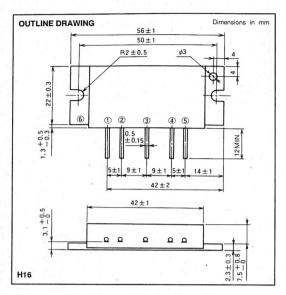
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	C 1 1	V _{BB} ≤ 5V	16	V
V _{BB}	Supply voltage	Vcc ≤ 12.5V	6	V
Icc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	20	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		- 30~110	℃ .
Tstg	Storage temperature		- 40~110	℃

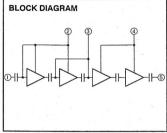
C	D	T	Limits		11-14
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 10mW Vcc1, 2 = 12.5V Vss = 5V	390	430	MHz .
Po	Output power		13		W
ηΤ	Total efficiency		35		%
2fo	2nd. harmonic		77 1/2 - 13	- 30	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 35	QB.
<i>p</i> in	Input VSWR			2.8	-
- 1	Load VSWR tolerance	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	No degradation		-



M67709SH

490~512MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:
①Pin:RF INPUT
②VCC1:1st. DC SUPPLY
③YGB:BASE BIAS
③VCC2:2nd. DC SUPPLY
⑥PO:RF OUTPUT
⑥GND:FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

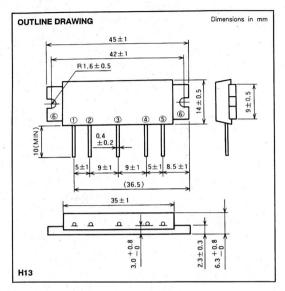
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	V _{BB} ≤ 5V	16	V
VBB	Supply Voltage	Vcc ≤ 12.5V	6.	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	20	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
TC(OP)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	%

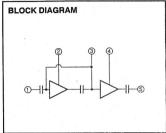
Symbol	Parameter	Test conditions	Limits		1
	Turumoter	rest conditions	Min	Max	Unit
f	Frequency range		490	512	MHz
Po	Output power	Pin = 10mW, Vcc1, 2 = 12.5V Vsa = 5V	13	Factories to to	W
ηт	Total efficiency		35	0.77	%
2fo	2nd. harmonic		00	- 30	/0
3fo	3rd. harmonic	Z _G = Z _L = 50 Ω		- 35	dB
Pin	Input VSWR		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.8	_
_	Load VSWR tolerance	$ \begin{array}{l} V_{CCI} = 12.5V, \ V_{CCI} = 15.2V, \ V_{BB} = 5V \\ Po = 13W \ (P_{In}: controlled) \\ Load \ VSWR=20:1 \ (AII \ phase), \ 2sec. \\ Z_G = 50\Omega \end{array} $			-



M67710L

135~160MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS

(a) VCC2 : 2nd. DC SUPPLY (b) Po : RF OUTPUT

@GND : FIN

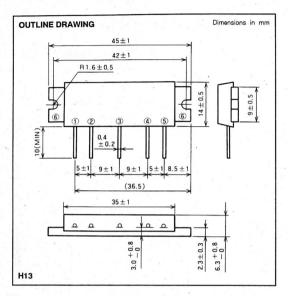
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

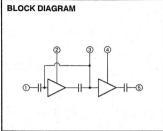
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	C l lt		13	V
V _{BB}	Supply voltage		6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	80	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

Symbol	Parameter	Test conditions	Limits		Unit
	Falametel	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 50mW Vas = 5V Vcc = 9.6V	135	160	MHz
Po	Output power		7	7 4 5	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic			- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
P in	Input VSWR		State Specia	2.5	-
-	Load VSWR tolerance	Vccı, 2 = 13V, Vss = 5V Po = 7W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. Za = 50 Q	No degradation		-

M67710H

150~175MHz, 9.6V, 7W, FM PORTABLE RADIO





PIN:

①Pin: RF INPUT ②VCCI: 1st. DC SUPPLY ③VBB: BASE BIAS ④VCC2: 2nd. DC SUPPLY ⑤PO: RF OUTPUT ⑥GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		13	V
V _{BB}	Supply Voltage		6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	80	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	2
Tstg	Storage temperature		-40~110	20

Symbol	Parameter	Test conditions	Limits		
O TITLO OF	i arameter	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 50mW VBB = 5V Vcc = 9.6V	150	175	MHz
Po	Output power		7		W
ηт	Total efficiency		40	E - 500 FB	%
2fo	2nd. harmonic		305 2 10 10	- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
P in	Input VSWR .			2.5	-
	Load VSWR tolerance	Vcc1, $z=13V$, VBB = $5V$ Po = $7W$ (Pin: controlled) Load VSWR= $20:1$ (All phase), 2sec. ZG = 50Ω	No degradation		-



B

CI

CURRENT

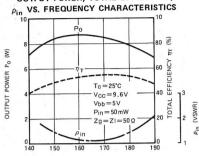
lc1 (A) <u>§</u>

STAGE CURRENT

F

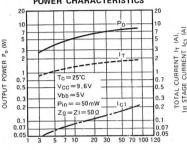
TOTAL

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY,



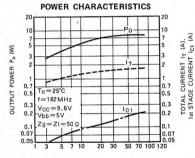
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



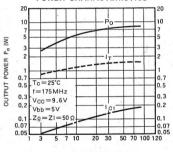
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT



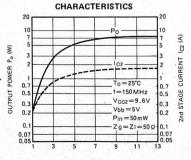
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



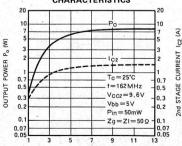
INPUT POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

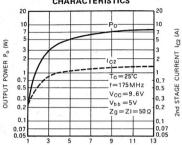


1st STAGE SUPPLY VOLTAGE VCC1 (V)



150~175MHz, 9.6V, 7W, FM PORTABLE RADIO

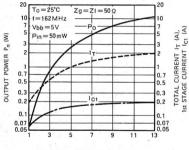
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



1st STAGE SUPPLY VOLTAGE VCC1 (V)

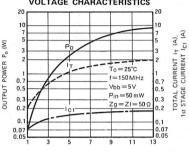
OUTPUT POWER, TOTAL CURRENT,

1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



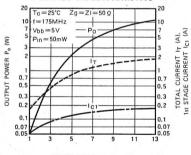
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



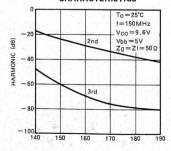
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



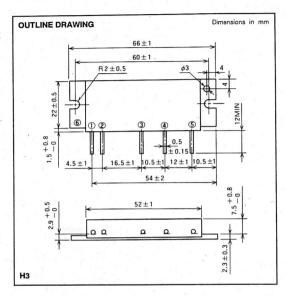
SUPPLY VOLTAGE VCC (V)

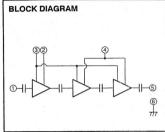
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (GHz)

1240~1300MHz, 12.5V, 16W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③ VBB : BASE BIAS DC SUPPLY

(4) VCC2 : 2nd. DC SUPPLY (5) PO : RF OUTPUT

@GND : FIN

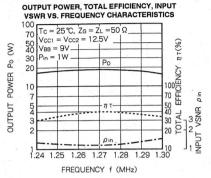
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

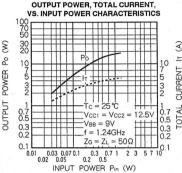
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2	0		, 17	V
VBB	Supply voltage		10	- V
lcc	Total current		8	A
Pin(max)	Input power	Vcc1=12. 5V, VBB=9V, ZG=ZL=50 Ω	2	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	· W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	℃

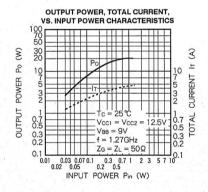
0 11	D	T	Limits		11.5
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range	Vcc1 = Vcc2 = 12.5V VBB = 9V Pin = 1W	1240	1300	MHz
Po	Output power		16	SERVICE .	W
ηΤ	Total efficiency		30		%
2fo	2nd. harmonic	$Z_{\rm G} = Z_{\rm L} = 50 \Omega$		- 45	dB
ρ in	Input VSWR	20 20 00 %		2.0	
-	Load VSWR tolerance	Vcc1 = Vcc2 = 15.2V, VBB = 9V Po = 16W (Pin: controlled) Load VSWR=16:1 (All phase), 5sec.	No degradation		-

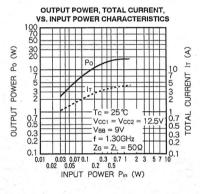


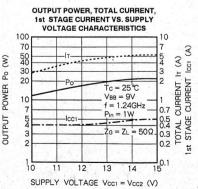
TYPICAL PERFORMANCE DATA

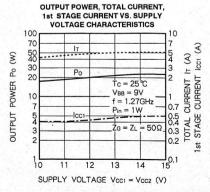




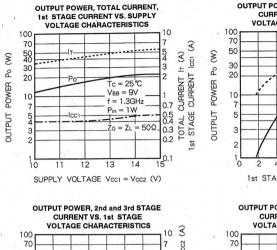


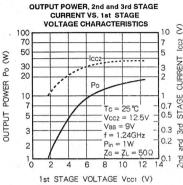


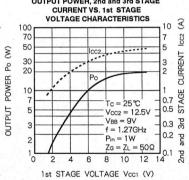


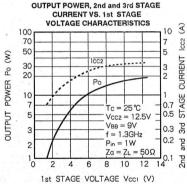


1240~1300MHz, 12.5V, 16W, FM MOBILE RADIO

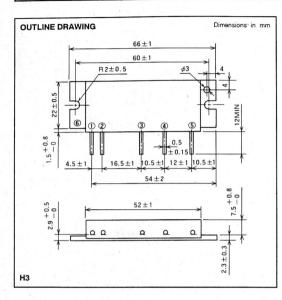


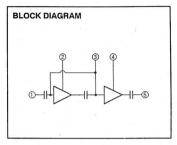






220~225MHz, 12.5V, 30W, SSB MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY

@GND : FIN

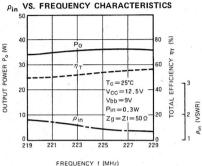
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
V _{BB}	Base bias		10	V
lcc	Total current		7	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.65	W.
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		-40~110	°C

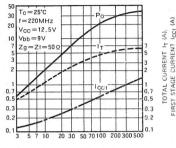
Symbol	Parameter	Test conditions	Limits		11.3
Oymbol	rarameter	Test conditions	Min	Max	Unit
f	Frequency range		220	225	MHz
Po	Output power		30		W
ηΤ	Total efficiency	P _{in} = 0.3W Vcc = 12.5V Zg = ZL = 50 Ω	43		%
2fo	2nd. harmonic		1 25 15 15 15 15	- 30	dB
3fo	3rd. harmonic	2G - 2L - 50 S2	WIND AND	- 35	dB
Pin .	Input VSWR		Marie Ca	2.8	3/2
_	Load VSWR tolerance	$ \begin{array}{l} V_{CC} = 15.2V, \ V_{BB} = 9V \\ Po = 30W \ (P_{in}: controlled) \\ Load \ VSWR=20:1 (AII \ phase), \ 2sec. \\ Z_G = 50 \ \Omega \\ \end{array} $	No degradation		-



TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY,



OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

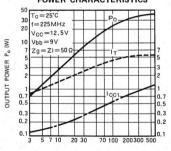


INPUT POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT

VS. 1st STAGE SUPPLY VOLTAGE

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



TOTAL CURRENT I_T (A), FIRST STAGE CURRENT I_{CC1} (A) 3

ď

POWER

OUTPUT

CHARACTERISTICS 30 20 10 3 ď Iccz CURRENT POWER T_C = 25°C =220MHz TUTTPUT 0.7 V_{CC2}=12.5V 0.5 Vbb=9V 0.5 0.3 0.3 Pin=0.3W 0.2 0.2 $Z_0 = Z_1 = 500$ 3 5 11 13

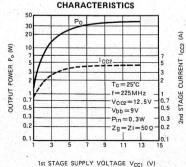
OUTPUT POWER, TOTAL CURRENT,

1st STAGE CURRENT VS. SUPPLY

VOLTAGE CHARACTERISTICS

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE

INPUT POWER Pin (mW)



OUTPUT POWER P. (W)

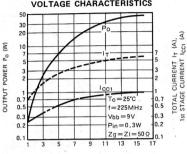
30 20 10 2 Tc=25°C 0.7 0.7 0.5 f=220MHz 0.5 0.3 Vbb=9V 0.3 0.2 Pin = 0.3W 0,2 $Zg = ZI = 50 \Omega$ 0.1 9 11 13

TOTAL CURRENT 1_T (A), FIRST STAGE CURRENT 1_{CC1} (A)

SUPPLY VOLTAGE VCC (V)

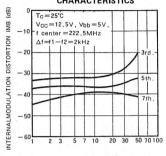
220~225MHz, 12.5V, 30W, SSB MOBILE RADIO

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



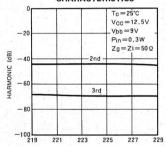
SUPPLY VOLTAGE VCC (V)

INTERNALMODULATION DISTORTION VS. PEACK ENVELOPE POWER CHARACTERISTICS



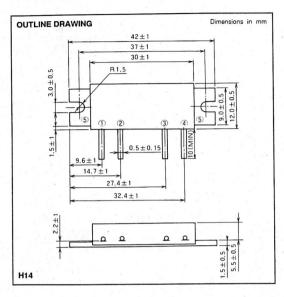
PEACK ENVELOPE POWER P.E.P. (W)

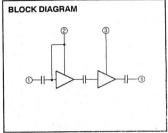
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (MHz)

220~225MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
() Pin: RF INPUT
(2) VBB: BASE BIAS
(3) VCC1: DC SUPPLY
(4) PO: RF OUTPUT
(5) GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

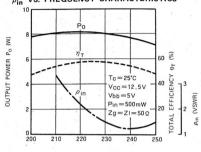
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1 1		16	V
Vвв	Supply voltage		6	V
lcc	Total current		3	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	1	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
TC(OP)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	~ ℃

0 1 1			Limits		Unit
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		220	225	MHz
Po	Output power	Pin = 400mW Vas = 5V Vcc = 12.5V Zg = ZL = 50 Ω	7		W
ηт	Total efficiency		45		%
2fo	2nd. harmonic		1000000	- 25	dB
3fo	3rd. harmonic			- 30	dB
ρ in	Input VSWR			2.5	
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC2}=13.2V,\ V_{BB}=5V\\ P_0=7W\ (P_{In}:controlled)\\ Load\ VSWR=20:1(All\ phase),\ 2sec.\\ Z_G=50\Omega \end{array} $	No degradation		-



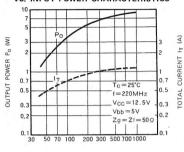
TYPICAL PERFORMANCE DATA

OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



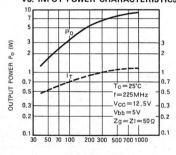
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT VS. INPUT POWER CHARACTERISTICS



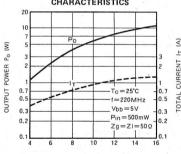
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT VS. INPUT POWER CHARACTERISTICS



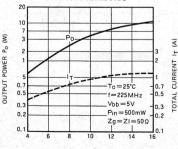
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT VS. TOTAL SUPPLY VOLTAGE CHARACTERISTICS



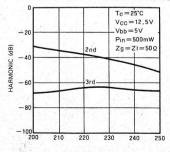
TOTAL SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT VS. TOTAL SUPPLY VOLTAGE CHARACTERISTICS



TOTAL SUPPLY VOLTAGE VCC (V)

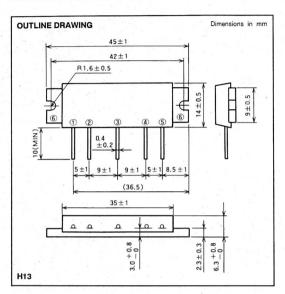
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS CURRENT VS. INPUT POWER CHARACTERISTICS

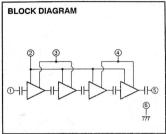


FREQUENCY f (MHz)



1240~1300MHz, 8V, 1.2W, SSB PORTABLE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLÝ ③VBB : BASE BIAS ④VCC2: 2nd. DC SUPPLY ⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

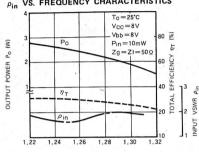
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1	1st, DC supply		9	V .
VBB	Base bias		9	V
Vcc2	2nd. DC supply		16	V
Icc	Total current		1.5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	4	W
Tc(OP)	Operation case temperature		- 20~100	℃
Tstg	Storage temperature		- 40~110	20

Symbol	Parameter	Test conditions	Limits		11.75
Oymboi	rarameter	rest conditions		Max	Unit
f	Frequency range		1240	1300	MHz
Po	Output power		1.2		W
ηт	Total efficiency	Vcc1 = Vcc2 = V _{BB} = 8V	18	Ja-11 (1866)	%
2fo	2nd. harmonic	$P_{in} = 10 \text{mW}$ $Z_G = Z_L = 50 \Omega$		- 30	dB
3fo	3rd. harmonic			- 35	dB
p in	Input VSWR			2.5	-
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC1} = 9V, \; V_{CC2} = 15.2V, \; V_{BB} = 9V \\ P_0 = 1.5W(P_{in}: controlled), \; Z_G = 50\Omega \\ Load \; VSWR=10:1 \; (All \; phase), \; 5sec \\ \end{array} $	No degradation		-
IMD ₃	3rd. inter modulation distortion	Vcc1=Vcc2=V88=8V Po(PEP)=1. 26W, Δf=20kHz, Z _G =Z _L =50 Ω		- 23	dBc



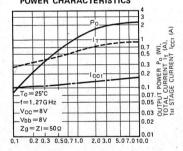
1240~1300MHz, 8V, 1.2W, SSB PORTABLE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY, $\rho_{\rm in}$ VS. FREQUENCY CHARACTERISTICS



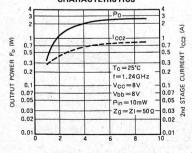
FREQUENCY f (GHz)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



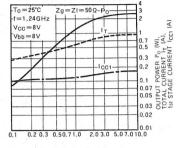
INPUT, POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



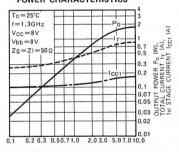
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



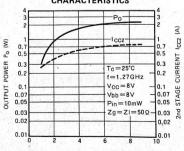
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



INPUT POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



1st STAGE SUPPLY VOLTAGE VCC1 (V)



J_T (A), I_{CC1} (A)

CURRENT

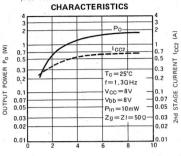
STAGE (

1st

TOTAL

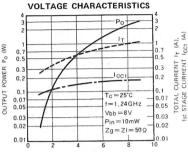
1240~1300MHz, 8V, 1.2W, SSB PORTABLE RADIO

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



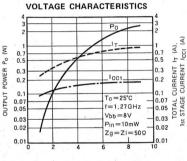
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY



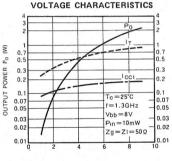
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY



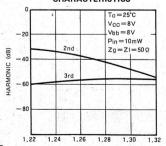
SUPPLY VOLTAGE VCC (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY



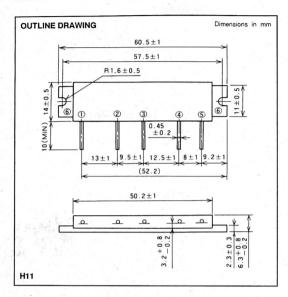
SUPPLY VOLTAGE VCC (V)

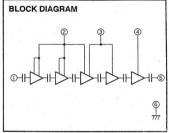
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (GHz)

872~905MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

Pin : RF INPUT

© VCC1 : 1st. DC SUPPLY

© VCC2 : 2nd. DC SUPPLY

© VCC3 : 3rd. DC SUPPLY

© PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter Conditions		Ratings	Unit
Vcc1			9	V
Vcc2	Supply voltage		9	V
Vccз			17	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 12.5V	7	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	°C

Symbol Parameter	Parameter	Test conditions	Limits		100
	. rarameter	rest conditions .	Min	Max	Unit
f	Frequency range		872	905	MHz
Po	Output power	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V Pin = 1mW ZG = ZL = 50 Ω	7		W
ηт	Total efficiency		35	STORY NOTES	%
2fo	2nd. harmonic		Contract to	- 30	dB
P in	Input VSWR			2.8	
-	Load VSWR tolerance	Vcc1 = Vcc2 = 8V, Vcc3 = 15.2V Po = 7W (Pin : controlled), Z _G = 50Ω Load VSWR-20:1 (All phase), 5sec.	No degradation		-

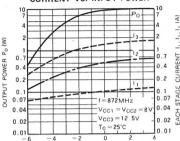


TYPICAL PERFORMANCE DATA

OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY 8 ŝ 13 o CURRENT POWER 0.4 0 4 0.2 0.2 TUATUC 0.1 n · 0.07 0.07 VCC2 Voca V_{CC3} = 12.5V 0 04 0.04 Pin = 1mW 0.02 0.02 T_C = 25°C 0.01 0.01 870 890 900 910

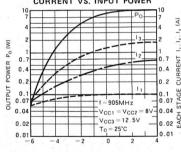
FREQUENCY f (MHz)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



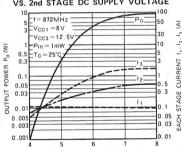
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



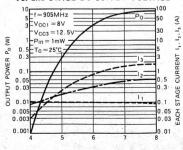
INPUT POWER Pin (dBm)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



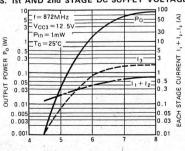
2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



2nd STAGE DC SUPPLY VOLTAGE VCC2 (V)

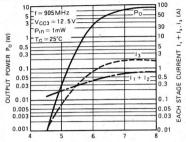
OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE VCC1 = VCC2 (V)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to the following consideration when designing a heat sink.

Junction temperature of incorporated transistors at standard operation.

- (1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.
 - a) First stage transistor

 $R_{th(j-c)1} = 20^{\circ} C/W (Typ.)$

b) Second stage transistor

 $R_{th(i-c)2} = 17.5^{\circ}C/W (Typ.)$

c) Third stage transistor

 $R_{th(i-c)3} = 16^{\circ} C/W (Typ.)$

d) Fourth stage transistor

 $R_{th(i-c)4} = 9^{\circ}C/W (Typ.)$

Final stage transistor

 $R_{th(i-c)5} = 6.5^{\circ}C/W (Typ.)$

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

 $P_0 = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1 \text{mW}$ $p_{in} = 35\%$ (minimum national)

1mW, η_T = 35% (minimum ratings),

I₁₊₂ = 0.781A (Total current from 1st stage to 4th

stage)

I₃ = 1.1A (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

Junction temperature of the first stage transistor

 $T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C^{(Note 1)}$ = $(8 \times 0.045 - 0.02 + 0.001) \times 20 + T_C^{(Note 1)}$

 $= 6.8 + T_{C} (^{\circ}C)$

Note 1: Case temperature of device

Junction temperature of the second stage transistor
 T_{j2} = (V_{CC1} x I_{T2} - P_{O2} + P_{O1}) x R_{th(j-c)2} + T_C
 = (8 x 0.08 - 0.2 + 0.02) x 17.5 + T_C

Stage .	V _{CC} (V)	I _T (mA)	Piri (mW)	Po (mW)
1st	8	45	1	20
2nd	8	80	20	200
3rd	8	160	200	500
4 th	. 8	496	500	2000
5th	12.5	1100	2000	7000

$$= 8.1 + T_{C} (^{\circ}C)$$

Junction temperature of the third stage transistor

$$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_{C}$$

= $(8 \times 0.16 - 0.5 + 0.2) \times 16 + T_{C}$

 $= 15.7 + T_C (^{\circ}C)$

Junction temperature of the fourth stage transistor
 T_{i4} = (V_{CC2} x I_{T4} - P_{O4} + P_{O3}) x R_{th(j-c)4} + T_C

$$ij_4 = (V_{CC2} \times i_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + I_C$$

= $(8 \times 0.496 - 2 + 0.5) \times 9 + T_C$

 $= 22.2 + T_{C} (^{\circ}C)$

Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$$

= $(12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$

$$= 56.9 + T_C (^{\circ}C)$$

2. Heat sink design

In thermal design of heat sink, keep the case temperature below $90^{\circ}C$ at output power P_{O} = 7W and ambient temperature = $60^{\circ}C$.

The thermal resistance R_{th(c-a)} (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31 \, (^{\circ}C/W)$$

Note 2: Including the contact thermal resistance

between device and heat sink

Mounting the device on the heat sink with above thermal
resistance, junction temperatures of each transistor become:

$$T_{j1} = 97^{\circ}C$$
, $T_{j2} = 99^{\circ}C$, $T_{j3} = 106^{\circ}C$, $T_{j4} = 113^{\circ}C$, $T_{j5} = 147^{\circ}C$ at $T_{a} = 60^{\circ}C$, $T_{C} = 90^{\circ}C$.

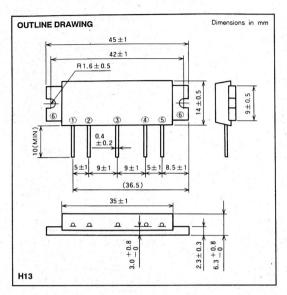
Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become:

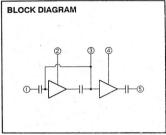
$$T_{j1} = 67^{\circ}C$$
, $T_{j2} = 69^{\circ}C$ $T_{j3} = 76^{\circ}C$, $T_{j4} = 76^{\circ}C$, $T_{i5} = 117^{\circ}C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



220~225MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
①Pin::RF INPUT
②VCCI::1st. DC SUPPLY
③VBB::BASE BIAS
④VCC2::2nd. DC SUPPLY
⑤PO::RF OUTPUT
⑥GND:FIN

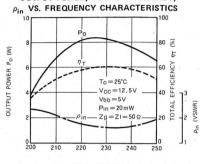
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1		16	V
V _{BB}	Supply voltage		6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	℃

Symbol	Parameter	Test conditions	Limits		11.5
Зуппоог	Farameter	rest conditions	Min	Max	Unit
f	Frequency range		220	225	MHz
Po	Output power	Pin = 20mW	7		W
ηт	Total efficiency	V _{BB} = 5V V _{CC} = 12.5V	45	SOME DE	%
2fo	2nd. harmonic			- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
P in	Input VSWR			2.5	
_	Load VSWR tolerance	$\begin{array}{c} V_{CC}=13.2V,\ V_{BB}=5V\\ P_0=7W\ (P_{in}:controlled)\\ Load\ VSWR=20:1\ (All\ phase),\ 2sec.\\ Z_G=50\ \Omega \end{array}$	No degradation		-

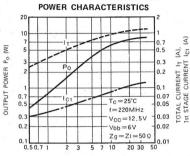


TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY,



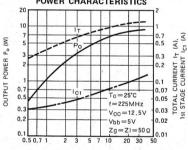
FREQUENCY f (MHz)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT



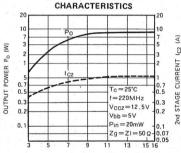
INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



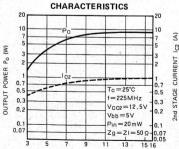
INPUT POWER Pin (mW)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



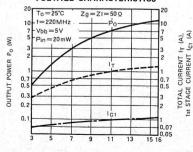
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

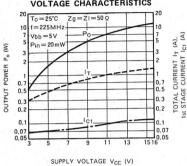


SUPPLY VOLTAGE VCC (V)

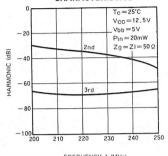


220~225MHz, 12.5V, 7W, FM PORTABLE RADIO

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

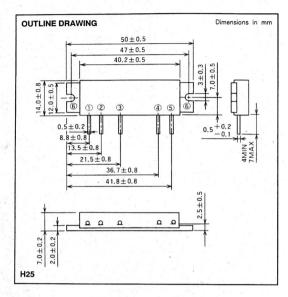


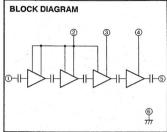
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (MHz)

824~849MHz, 7.2V, 1.6W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

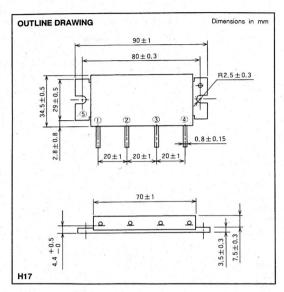
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

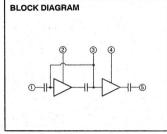
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		9	V
lcc	Total current		3	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	7	mW
Po(max)	Output power	Z _G = Z _L = 50 Ω	3	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	°C

Symbol f	Parameter	Test conditions	Limits		
		rest conditions	Min	Max	Unit
f	Frequency range	Vcc1 = Vcc2 = Vcc3 = 7.2V	824	849	MHz
Po	Output power	$P_{in} = 1 \text{ mW}, Z_G = Z_L = 50 \Omega$	1.6		W
ηт	Total efficiency	Po = 1.6W (Vcci : controlled)	35	Total Control	%
2fo	2nd. harmonic	Po = 1.6W (Vcc1 : controlled) Vcc2 = Vcc3 = 7.2V Pin = 1mW, Zg = ZL = 50Ω	5 7 7 7 7	- 30	dB
Pin	Input VSWR	$P_{in} = 1 \text{ mW}, Z_G = Z_L = 50 \Omega$	A Section	2.8	_
- - -	Load VSWR tolerance	Vcc2 = Vcc3 = 9V Po = 1.6W (Vcc1 : controlled) Pin = 1mW Load VSWR=20:1(AII phase), 2sec.	No degradation		_



144~148MHz, 12.5V, 60W, MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB: BASE BIAS
④ VCc2: 2nd. DC SUPPLY
⑤ PO: RF OUTPUT
⑥ GND: FIN

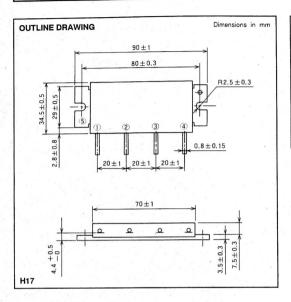
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

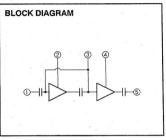
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		16	V
VBB	Supply Voltage		10	V
Icc	Total current		24	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.8	W
Po(max)	Output power	Zg = ZL = 50 Ω	. 78	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	20

Symbol	Parameter	Test conditions	Limits		11.50
Cymbol		rest conditions	Min	Max	Unit
f	Frequency range		144	148	MHz
Po	Output power	P _{In} = 0.5W V _{BB} = 9V V _{CC} = 12.5V Z _G = Z _L = 50 Ω	60		W
η-Τ	Total efficiency		50		%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic			- 35	dB
ρ in	Input VSWR		King Consi	2.8	1 - 1
-	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ $P_{O} = 55W$ (Pin: controlled) Load VSWR=8.8:1 (AII phase), 2sec. $Z_{G} = 50$ Ω	No degradation		- -



430~450MHz, 12.5V, 60W, SSB MOBILE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VBB : BASE BIAS @VCC2: 2nd. DC SUPPLY ⑤PO : RF OUTPUT ⑥GND : FIN

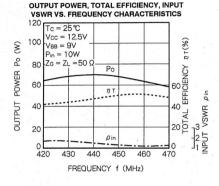
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

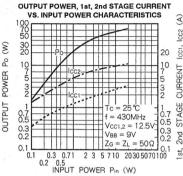
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1 1		16	V
VBB	Supply voltage		10	V
lcc	Total current		25	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	14	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	78	W
Tc(OP)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		-40~110	℃.

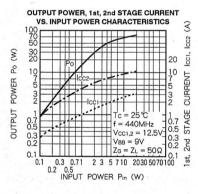
Symbol	Parameter	Test conditions	Limits		11.5
Symbol			Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P _{in} = 10W V _{BB} = 9V V _{CC} = 12.5V	60	100	W
ηт	Total efficiency		40	A Charles	%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	4 17 17 18	- 35	dB
Pin	Input VSWR		STATE OF STATE	2	-
-	Load VSWR tolerance	Vcc1, 2 = 15.2V, Vaa = 9V Po = 55W (Pin : controlled) Load VSWR-8.8:1 (AII phase), 2sec. Zg = 50 Ω	No degradation		-

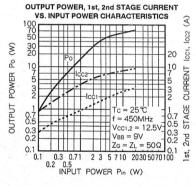


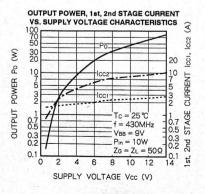
TYPICAL PERFORMANCE DATA

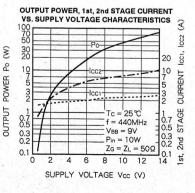




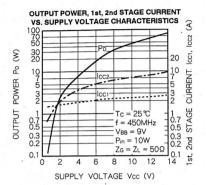


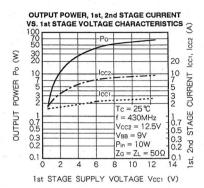


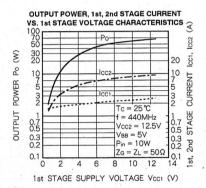


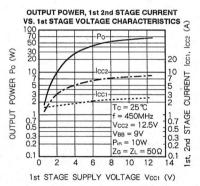


430~450MHz, 12.5V, 60W, SSB MOBILE RADIO



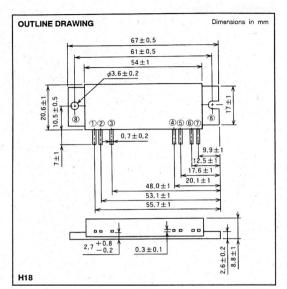


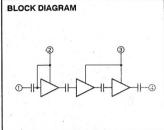




M67729L2

400~420MHz, 12.5V, 20W, FM MOBILE RADIO





PIN: ①Pin:RFINPUT ②GND

③VCC1: 1st. DC SUPPLY ④GND ⑤VCC2: 2nd. DC SUPPLY

@GND

⑦PO : RF OUTPUT ®GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

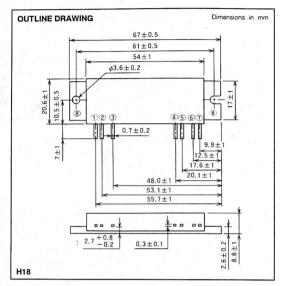
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		16	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.3	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	30	W
Tc(op)	Operation case temperature		-30~110	20
Tstg	Storage temperature		- 40~110	℃

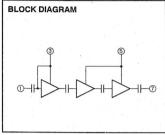
ELECTRICAL CHARACTERISTICS (T_C = 25 ℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		11.0
		Test conditions	Min	Max	Unit
f	Frequency range		400	420	MHz
Po	Output power	P _{in} = 0.15W V _{CC} = 12.5V Z _G = Z _L = 50 Ω	20	4.5	W
ηт	Total efficiency		35	9.7	%
2fo	2nd. harmonic			- 30	dB
ρ in	Input VSWR			2.8	3-3
-	Load VSWR tolerance	Vcc = 15.5V, Po = 25W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Ze = 50 Ω	No degradation		-

M67729H2

450~460MHz, 12.5V, 20W, FM MOBILE RADIO





PIN: :
Pin : RF INPUT

@CND

@Vcc1: 1st. DC SUPPLY

@GND

Vcc2: 2nd. DC SUPPLY

@GND

PPO : RF OUTPUT

@GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

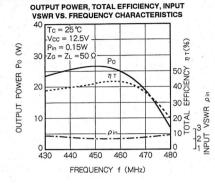
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		16	V
lcc	Total current		6	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.3	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	30	W
Tc(op)	Operation case temperature		-30~110	%
Tstg	Storage temperature		- 40~110	20

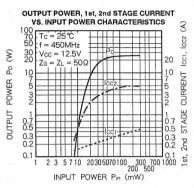
Symbol	Parameter	Test conditions	Limits		5 THE
		rest conditions	Min	Max	Unit
f	Frequency range		450	460	MHz
Po	Output power	Pin = 0.15W Vcc = 12.5V Zg = ZL = 50 Ω	20		W
ηΤ	Total efficiency		35		%
2fo	2nd. harmonic			- 30	dB
p in	Input VSWR		A MARKET	2.8	-
÷	Load VSWR tolerance	Vcc = 15.5V, Po = 25W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. ZG = 50Ω	No degradation		-

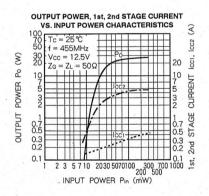


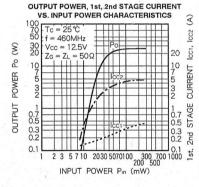
450~460MHz, 12.5V, 20W, FM MOBILE RADIO

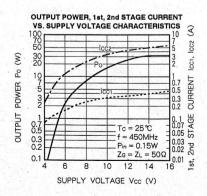
TYPICAL PERFORMANCE DATA

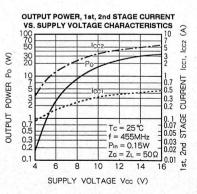






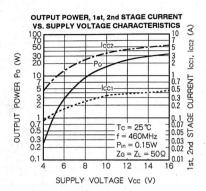


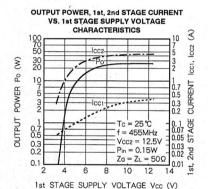


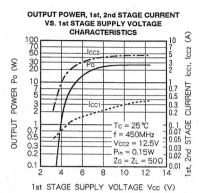


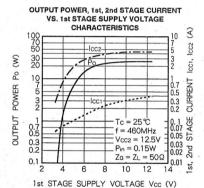
M67729H2

450~460MHz, 12.5V, 20W, FM MOBILE RADIO



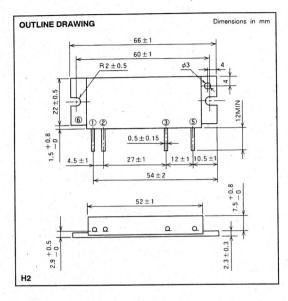


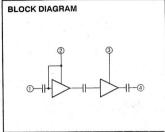




M67730L

175~200MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:
(Pin : RF INPUT
(VCC1: 1st. DC SUPPLY
(VCC2: 2nd. DC SUPPLY
(Po : RF OUTPUT
(G) GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions .	Ratings	Unit
Vcc	Supply voltage		17	V
lcc	Total current		7	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	°

0 1 1	Parameter	T	Limits		Unit
Symbol		Test conditions	Min	Max	Unit
f	Frequency range		175	200	MHz
Po	Output power	P _{in} = 0.3W Vcc = 12.5V Zg = ZL = 50 Ω	30	10 2 3 Y	W
ητ	Total efficiency		43		%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic		2 1 1 1	- 35	dB
ρ in	Input VSWR			2.8	-
-	Load VSWR tolerance	$\begin{array}{c} \mbox{Vcc=15.2V,} \\ \mbox{Po=30W (Pin:controlled)} \\ \mbox{Load VSWR=20:1 (AII phase), 2sec.} \\ \mbox{Zg=50} \ \ \mbox{Ω} \end{array}$	No degrad	No degradation	

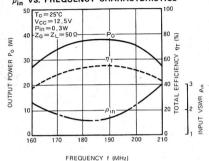


(A)

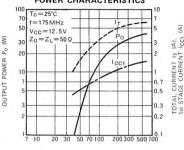
8

175~200MHz, 12.5V, 30W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA OUTPUT POWER, TOTAL EFFICIENCY, $ho_{ m in}$ VS. FREQUENCY CHARACTERISTICS

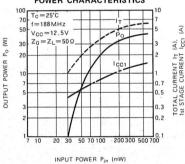


OUTPUT POWER, TOTAL CURRENT. 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

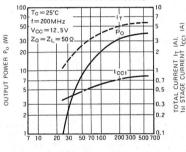


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

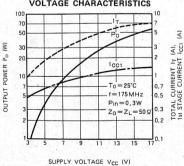


OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

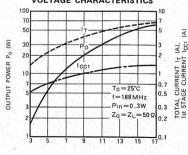


INPUT POWER Pin (mW)

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY **VOLTAGE CHARACTERISTICS**



OUTPUT POWER, TOTAL CURRENT. 1st STAGE CURRENT VS. SUPPLY **VOLTAGE CHARACTERISTICS**



SUPPLY VOLTAGE VCC (V)

3

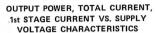
CC2

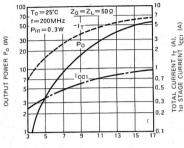
CURRENT

STAGE

2nd

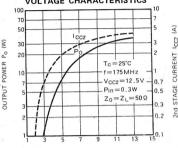
175~200MHz, 12.5V, 30W, FM MOBILE RADIO





STAGE CURRENT TOTAL 1st STA

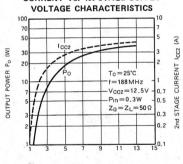
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



1st STAGE SUPPLY VOLTAGE VCC1 (V)

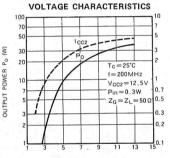
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY

SUPPLY VOLTAGE VCC (V)



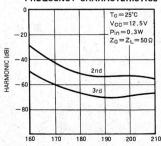
1st STAGE SUPPLY VOLTAGE VCC1 (V)

OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY



1st STAGE SUPPLY VOLTAGE VCC1 (V)

2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



FREQUENCY f (MHz)

DESIGN CONSIDERATION OF HEAT RADIA-

Please refer to following consideration when designing heat sink.

Junction temperature of incorporated transistors at standard operation.

- Thermal resistance between junction and package of incorporated transistors.
 - a) First stage transistor

$$R_{th(i-c)1} = 8^{\circ}C/W \text{ (Typ.)}$$

b) Second stage transistor

$$R_{th(i-c)2} = 2^{\circ}C/W$$
 (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

Conditions for standard operation.

$$P_o = 30W$$
, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 43\%$ (minimum rating), P_{o1} (Note 1) = 5W, $I_T = 5.6A$ (I_{T1} (2) = 0.9A, I_{T2} (3) = 4.7A)

Note 1: Output power of the first stage transitor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor
$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_{C}^{(4)}$$

= (12.5 x 0.9 - 5 + 0.3) x 8 + T_{C}

$$= (12.5 \times 0.9 - 5)$$

= 52 + T_C (°C)

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_C$$

= (12.5 x 4.7 ~ 30 + 5) x 2 + T_C
= 68 + T_C (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a=60^\circ C$) and at the output power of 28W below $90^\circ C$.

The thermal resistance $R_{\text{th}(j-a)}^{(5)}$ of the heat sink to realize this:

$$R_{\text{th(c-a)}} = \frac{T_{\text{C}} - T_{\text{a}}}{(P_{\text{o}}/\eta_{\text{T}}) - P_{\text{o}} + P_{\text{in}}} = \frac{90 - 60}{(30/0.43) - 30 + 0.3}$$
$$= 0.75 \, (^{\circ}\text{C/W})$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

 $T_{j1} = 142^{\circ} C$, $T_{j2} = 158^{\circ} C$ at $T_a = 60^{\circ} C$, $T_C = 90^{\circ} C$.

In the annual average of ambient temperature is 30°C,

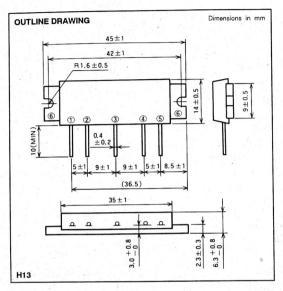
 $T_{j1} = 112^{\circ}C, T_{j2} = 128^{\circ}C$

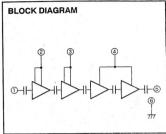
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.



M67732

1240~1300MHz, 7.2V, 1W, FM PORTABLE RADIO





PIN:
① Pin : RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ VCC3: 3nd. DC SUPPLY
⑤ PO : RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2			9	V .
Vccз	Supply voltage		16	V
lcc '	Total current		1.5	A
Pin(max)	Input power	$V_{CC1} \le 8V$, $Z_G = Z_L = 50 \Omega$	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	5	W
Tc(op)	Operation case temperature		- 20~110	℃
Tsta	Storage temperature		-40~110	℃

		-	Limits		Unit
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		1240	1300	MHz
Po	Output power	V _{CC1} = V _{CC2} = V _{CC3} = 7.2V P _{in} = 7mW	1	Navi A	W
ηΤ	Total efficiency		25		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	-
-	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 9V$, $V_{CC3} = 15V$ $P_0 = 2W$ (P_{in} : controlled) Load VSWR=10:1 (All phase), 5sec. $Z_G = 50 \Omega$	No degradation		-

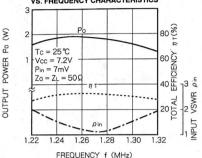


15

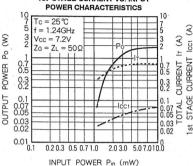
1240~1300MHz, 7,2V, 1W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA

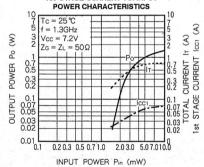
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



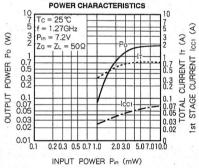
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT



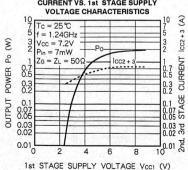
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT



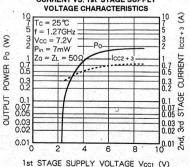
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT



OUTPUT POWER, 2nd, 3rd STAGE **CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS**

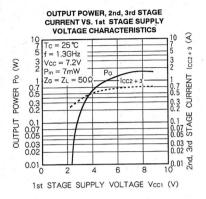


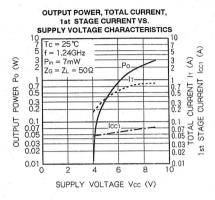
OUTPUT POWER, 2nd, 3rd STAGE CURRENT VS. 1st STAGE SUPPLY

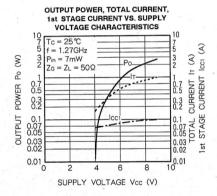


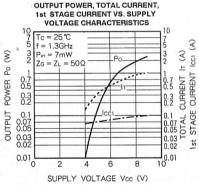
M67732

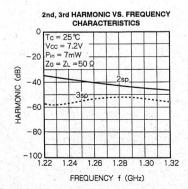
1240~1300MHz, 7,2V, 1W, FM PORTABLE RADIO







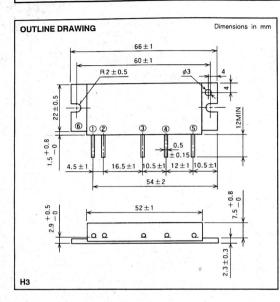


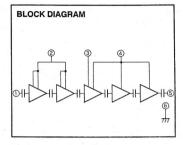




M67736

896~941MHz, 12.5V, 12W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS SUPPLY
④ VCC2 : 2nd. DC SUPPLY
⑤ PO : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1	Supply voltage		13	V
VBB	Base bias		9	· V
Vcc2	Supply voltage		17	V
Icc	Total current		5	A
Pin(max)	Input power	Zg=ZL=50Ω, Vcc1≤12.5V, VBB=8V	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature	: '' - '' - '' - '' - '' - '' - '' - ''	- 40~110	2

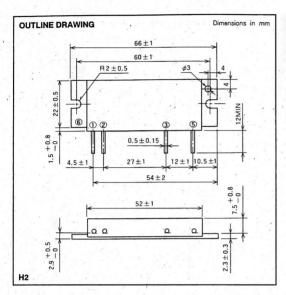
ELECTRICAL CHARACTERISTICS (T_C = 25 ℃ unless otherwise noted)

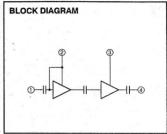
Symbol	Parameter	Test conditions	Limits		
Sylfidol	Falameter	rest conditions	Min	Max	Unit
f	Frequency range		896-902	935-941	MHz
Po	Output power	Vcc1 = Vcc2 = 12.5V VBB = 8V Pin = 5mW	12		W
ηT	Total efficiency		30		%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR	20 20 00 1		2.8	. A
-	Load VSWR tolerance	Po = 15W (Vcc1 : controlled) VaB = 8V, Vcc2 = 15.2V Pin = 5mW, Za = 50 Ω Load VSWR-20:1 (Al I phase), 5sec.	No degradation		-



M67741L

135~160MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

@Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

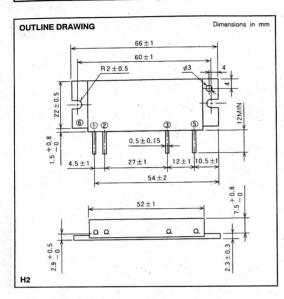
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	Supply voltage		17	V	
lcc	Total current		7	. A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.5	W	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	35	W	
Tc(op)	Operation case temperature		-30~110	2	
Tstg	Storage temperature		-40~110	2	

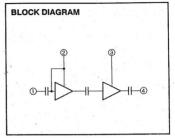
Symbol	Parameter	Test conditions	Limits		17.0
Oylilloo!	rafameter	Test conditions	Min	Max	Unit
f	Frequency range		135	160	MHz
Pó.	Output power	Pin = 0.2W Vcc = 12.5V Zg = Zt = 50 Ω	30		W
ηT	Total efficiency		40	1000	%
2fo	2nd. harmonic		E. Marie Port	- 25	dB
3fo	3rd. harmonic	26 - 2L - 30 Ω	3 1 3 3	- 30	dB
<i>p</i> in	Input VSWR		10.00	3.3	7 1 <u>5</u> 3
-	Load VSWR tolerance	$\begin{tabular}{lll} Vcc=15.2V, \\ Po=30W '(Pin: controlled) \\ Load VSWR=20:1 (All phase), 2sec. \\ Z_G=50 \ Q \end{tabular}$	No degradation		_



M67741H

150~175MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

① Pin: RF INPUT
② VCC1: 1 st. DC SUPPLY
③ VCC2: 2nd. DC SUPPLY
④ PO: RF OUTPUT
⑤ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

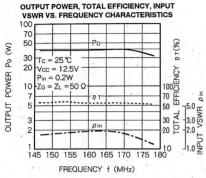
Symbol	Parameter	Parameter Conditions		Unit
Vcc	Supply voltage		17	٧
lcc .	Total current		7	Α
Pin(max)	Input power .	Z _G = Z _L = 50 Ω	0.5	W
Po(max)	Output power	Z _G = Z _L = 50 Ω	35	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	℃

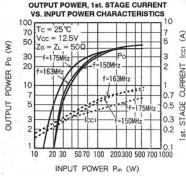
Symbol		T	Limits		Link
	Parameter	Test conditions	Min	Max	Unit
f	Frequency range		150	175	MHz
Po	Output power	P _{in} = 0.2W Vcc = 12.5V Z _G = Z _L = 50 Ω	30	10 m 70	W
ητ	Total efficiency		40	1000	%
2fo	2nd. harmonic			- 25	· dB
3fo	3rd. harmonic	2G - 2L - 30 S2	187 - 186	- 30	dB
p in	Input VSWR		Ye. (- 1	3.3	-
_	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 15.2 \mbox{V} \\ \mbox{Po} = 30 \mbox{W} \ (\mbox{Pin}: \mbox{controlled}) \\ \mbox{Load} \ \mbox{VSWR=20:1} \ (\mbox{AII} \ \mbox{phase}), 2 \mbox{sec.} \\ \mbox{Zg} = 50 \ \Omega \\ \end{array} $	No degradation		-



150~175MHz, 12.5V, 30W, FM MOBILE RADIO

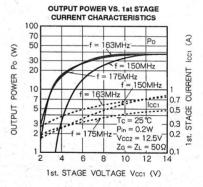
TYPICAL PERFORMANCE DATA



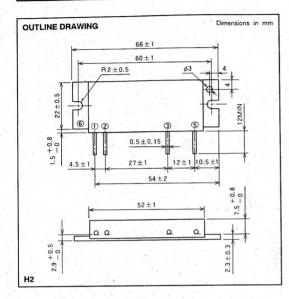


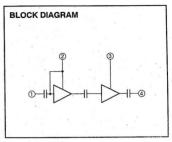
OUTPUT POWER VS. SUPPLY VOLTAGE CHARACTERISTICS 100 Tc = 25 ℃ 70 Pin = 0.2W 50 $Z_G = Z_L = 50\overline{\Omega}$ 30 Po 20 POWER f = 163MHz10 = 175MHz DUTPUT 5 3 = 150MHz 2 8 10 12 14

SUPPLY VOLTAGE Vcc1 = Vcc2 (V)



68~88MHz, 12.5V, 30W, FM MOBILE RADIO





PIN:

Pin : RF INPUT

②VCC1 : 1st. DC SUPPLY

③VCC2 : 2nd. DC SUPPLY

④PO : RF OUTPUT

⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

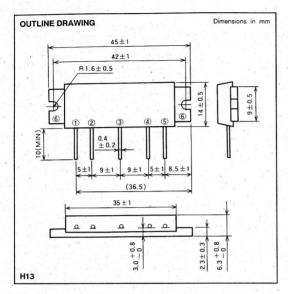
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		10	Α
Pin(max)	Input power	$Z_G = ZL = 50 \Omega$	0.8	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	40	W
TC(OP)	Operation case temperature		- 30~110	°C
Tstg	Storage temperature		- 40~110	°C

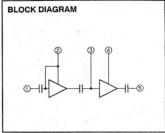
		¥ 7,	Limits		Unit
Symbol	Parameter ,	Test conditions	Min	Max	Unit
f	Frequency range		68	88	MHz
Po	Output power	P _{in} = 0.5W Vcc = 12.5V Z _G = Z _L = 50 Ω	30	16.000	. W
ηт	Total efficiency		40		%
2fo	2nd. harmonic		1	- 25	dB
3fo	3rd. harmonic	26 - 21 - 30 \$2		- 30	dB
p in	Input VSWR		3141	2.8	A - 4
- 1	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. Zg = 50 Ω	No degradation		-



M67743L

68~81MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③VBB : BASE BIAS

@Vcc2 : 2nd. DC SUPPLY (S) PO : RF OUTPUT (S) GND : FIN

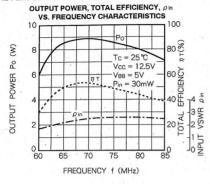
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

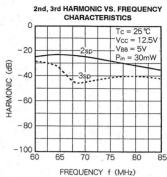
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	C l l		15	V
VBB	Supply voltage		5.5	V
lcc	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
TC(OP)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	0°

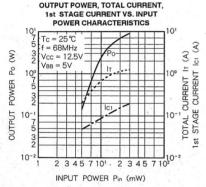
Symbol	Parameter	Test conditions	Limits		Unit
Syrribol	Faranteter	rest conditions	. Min	Max	Unit
f.	Frequency range		68	81	MHz
Po	Output power	Pin = 30mW VBB = 5V Vcc = 12.5V	. 7	23-12-13	W
ηт	Total efficiency		38	1.7-1.5	%
2fo	2nd. harmonic			- 18	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 25	dB
Pin	Input VSWR		A MARKET A STATE	4.0	
1 1746 	Load VSWR tolerance	$\label{eq:Vcc} \begin{array}{l} V_{CC} = 13.2V, \ V_{BB} = 5V \\ Po = 7W \ (P_{In}: controlled) \\ Load \ VSWR-20:1 \ (All\ phase), 2sec. \\ Z_G = 50 \ \Omega \end{array}$	No degradation		=

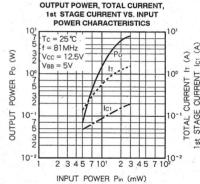


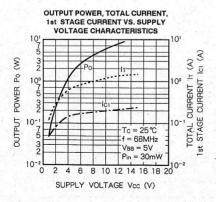
TYPICAL PERFORMANCE DATA

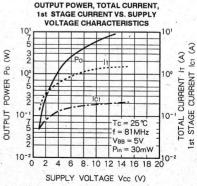






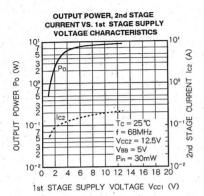


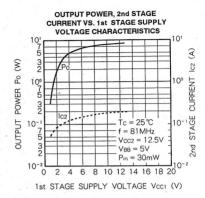




M67743L

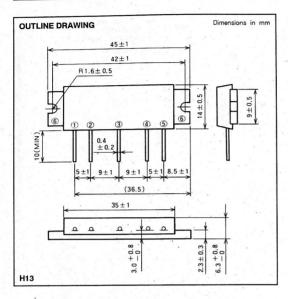
68~81MHz, 12.5V, 7W, FM PORTABLE RADIO

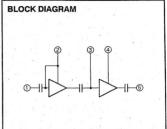




M67743H

77~88MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2 ! 2nd. DC SUPPLY
⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

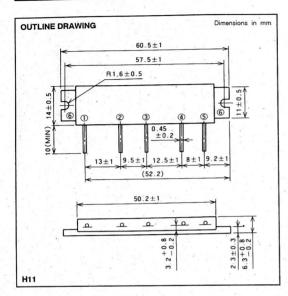
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1		15.	V
Vвв	Supply voltage		5.5	· V
lcc	Total current		4	Α
Pin(max),	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	°C
Tstg	Storage temperature		-40~110	℃

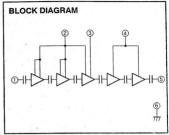
Symbol	D	Test conditions	Limits		0.30
	Parameter ,	lest conditions	Min	Max	Unit
f	Frequency range		77	88	MHz
Po	Output power	Pin = 30mW	7.	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	W
ηт	Total efficiency	V _{BB} = 5V	38		%
2fo	2nd. harmonic	Vcc = 12.5V Zg = ZL = 50 Ω	N. 19. 19. 19.	- 18	dB
3fo	3rd. harmonic			- 25	dB
p in	Input VSWR		h	5.0	man di
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC} = 13.2 \text{V, } V_{BB} = 5 \text{V} \\ Po = 7 \text{W (Pin : controlled)} \\ \text{Load VSWR=20:1 (AII phase), 2sec.} \\ Z_G = 50 \ \Omega \end{array} $	No degradation		-



M67745

846~903MHz, 12.5V, 7W, FM MOBILE RADIO





PIN':

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

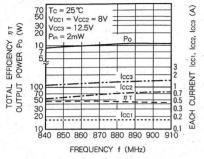
Symbol	Parameter	Conditions .	Ratings	Unit
Vcc1, 2			9	V
Vccз	Supply voltage		17	V
lcc ·	Total current		4	A
Pin(max)	Input power	f=846~903MHz, Vcc1 ≤ 8V, Zc=ZL=50 Ω	7	· mW
Po(max)	Output power	Ditto	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	. ℃

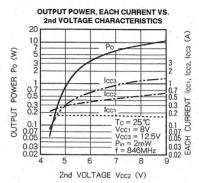
		T	Limits		1.1-14
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range	Vcc1 = Vcc2 = 8V Vcc3 = 12.5V Pin = 2mW Zc = ZL = 50 Ω	846	903	MHz
Po	Output power		7		W
ηT -	Total efficiency		35	5000000	%
2fo	2nd. harmonic			- 30	dB
<i>p</i> in	Input VSWR			2.8	_
_	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V Po = 7W (Vcc2 : controlled) Pin = 2mW Load VSWR=20:1(AII phase), 5sec.	No degradation		-

846~903MHz, 12.5V, 7W, FM MOBILE RADIO

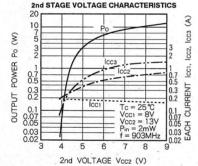
TYPICAL PERFORMANCE DATA

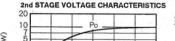
TOTAL EFFICIENCY, OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



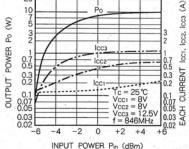


OUTPUT POWER, EACH STAGE CURRENT VS.

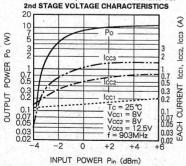




OUTPUT POWER, EACH STAGE CURRENT VS.

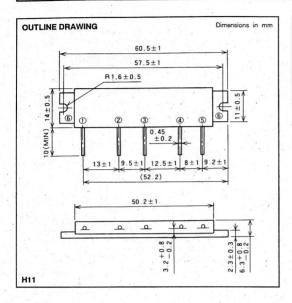


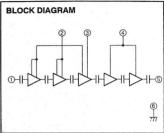
OUTPUT POWER, EACH STAGE CURRENT VS.



M67747A

898~925MHz, 12.5V, 7W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2	Superior continue		9	V
Vccз	Supply voltage		17	V
lcc	Total current		4	A
Pin(max)	Input power	$f=846\sim925MHz$, $Vcc1\leq8V$, $Z_G=Z_L=50\Omega$	10	mW
Po(max)	Output power	Ditto	10	W
Tc(op)	Operation case temperature	있다. 레이지는 그리고 생각되었다고 그리고 얼마나 없다.	-30~110	°C
Tstg	Storage temperature		- 40~110	℃

Symbol	Parameter	Test conditions	Limits		11.0
0,111001	Talametei	Test conditions	Min	Max	Unit
f	Frequency range	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V	898	925	MHz
Po	Output power	$P_{in} = 1 \text{mW}, Z_G = Z_L = 50 \Omega$	7	A STATE OF THE STA	W
ηт	Total efficiency	Vcc1=8V, Po=6W(Vcc2 : controlled)	35	N - 1 3 4 2 3	%
2fo	2nd. harmonic	Vcc3 = 12.5V,Pin = 1mW		- 30	dB
Pin	Input VSWR	$Z_G = Z_L = 50 \Omega$	6. 10. 10. 10.	2.5	
-	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V Po = 6W(Vcc2 : controlled) Pin = 1 mW Load VSWR=20:1 (A11 phase), 5sec.	No degradation		-



0.1 0.07 0.05

0.03

0.02

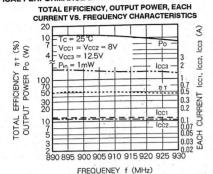
8 9

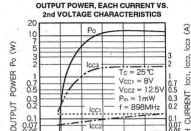
Vcc2 (V)

EACH

898~925MHz, 12.5V, 7W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA





Icc:

VOLTAGE

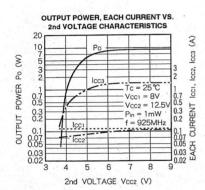


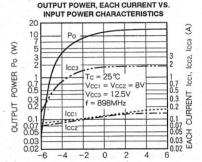
3 4 5 6

2nd

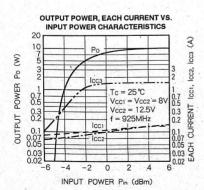
0.1 0.07 0.05

0.03





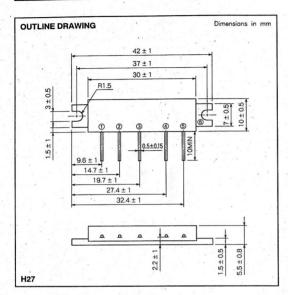
INPUT POWER Pin (dBm)

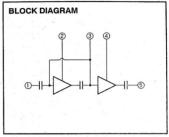




M67748L

135~150MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①PO : RF INPUT ②VCC2: 2nd. DC SUPPLY ③VBB : BASE BIAS ④VCC1: 1st. DC SUPPLY ⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

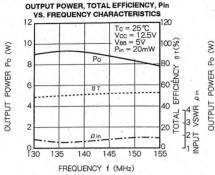
Symbol	Parameter	Conditions	Ratings	Unit
Vcc *	Sl		15	V
V _{BB}	Supply voltage		5.5	V
lcc-	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	°C
Tstg	Storage temperature		- 40~110	℃

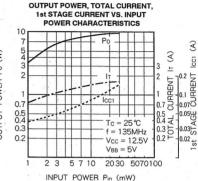
Symbol	Parameter		Limits		111-24
	Farameter	Test conditions	Min	Max	Unit
f .	Frequency range	P _{in} = 20mW V _{BB} = 5V V _{CC} = 12.5V Z _G = Z _L = 50 Ω	135	150	MHz
Po	Output power		7		W
ηт	Total efficiency		45		%
2fo	2nd. harmonic			- 20	dB
3fo	3rd. harmonic			- 25	dB
ρ in	Input VSWR			2.5	((A) - (
-	Load VSWR tolerance	Vcc2 = 13.2V, Vaa = 5V Po=7W(Vcc1 : controlled)P _{in} =20mW Load VSWR=20:1 (All phase), 2sec. Zg = 50Ω	No degradation		-



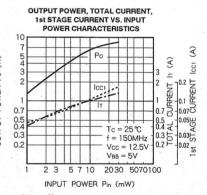
135~150MHz, 12.5V, 7W, FM PORTABLE RADIO

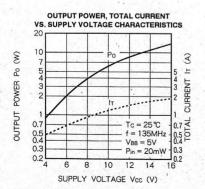


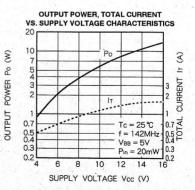




OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT **POWER CHARACTERISTICS** 10 7 54 3 CC 3 3 Ŀ DUTPUT POWER Po Ъ 0.2 LN -0.1 L0 -0.070 2 1 0.70 CURRENT 2 2 In POWER _; lcc. 0.7 0.5 0.05 0.5 0.4 DUTPUT Tc = 25 ℃ 0.03 0.3 0.3 0.2 f = 142MHz0.02 0.2 Vcc = 12.5V VBB = 5V 3 5 7 10 2030 5070100 INPUT POWER Pin (mW)

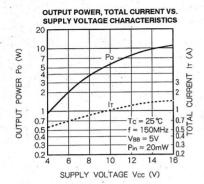






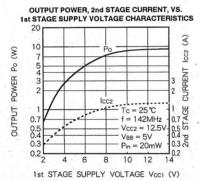
M67748L

135~150MHz, 12.5V, 7W, FM PORTABLE RADIO



OUTPUT POWER, 2nd STAGE CURRENT, VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS 20 Tc = 25 ℃ 3 f = 135MHz10 Vcc2 = 12.5V 3 lcc2 $V_{BB} = 5V$ 8 54 $P_{in} = 20mV$ CURRENT POWER 3 3 2 2 lcc2 20.5 0.3 204 STAGE DUTPUT 0.7 0.5 0.3 0.2 6 8 10 12

1st STAGE SUPPLY VOLTAGE Vcci (V)

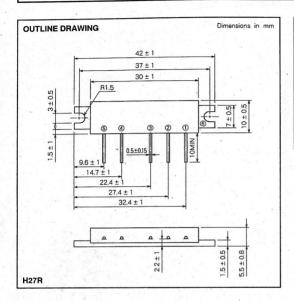


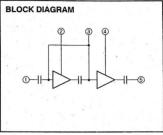
OUTPUT POWER, 2nd STAGE CURRENT, VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS 20 3 10 3 CC2 7 Tc = 25 ℃ Po 54 f = 150MHzCURRENT POWER Vcc2 = 12.5V 3 $V_{BB} = 5V$ 2 $P_{in} = 20mW$ lcc2 0.7 SE 0.5.0 P DUTPUT 0.7 0.5 0.4 p 0.3 % 0.3 J_{0.2} 0.2 6 8 10 12

1st STAGE SUPPLY VOLTAGE Vcci (V)

M67748LR

135~150MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①Pin: RF INPUT
②VCCI: 1st. DC SUPPLY
③VBB: BASE BIAS
④VCC2: 2nd. DC SUPPLY
⑤PO: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

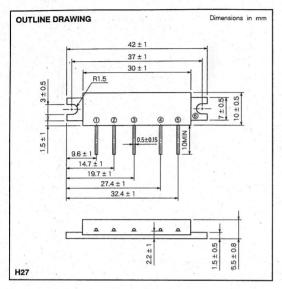
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0 1 4		15	V
V _{BB}	Supply voltage		5.5	V
lcc ·	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
TC(OP)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

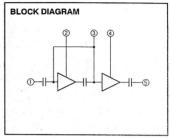
Symbol	Parameter	-	Limits		
Symbol	rarameter	Test conditions	Min	Max	Unit
f	Frequency range		135	150	MHz
Po	Output power	Pin = 20mW	`7	4 De te tan I	W
ηт	Total efficiency	V _{BB} = 5V	45		%
2fo	2nd. harmonic	Vcc = 12.5V		- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	The same of the	- 25	dB
Pin	Input VSWR			2.5	
_	Load VSWR tolerance	Vcc2 = 13.2V, VBB = 5V Po=7W(Vcc1:controlled) Pin=20mW Load VSWR=20:1(All phase), 2sec. Zg = 50Ω	No degradation		



M67748H

150~174MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT

②VCC2: 2nd. DC SUPPLY ③VBB: BASE BIAS

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

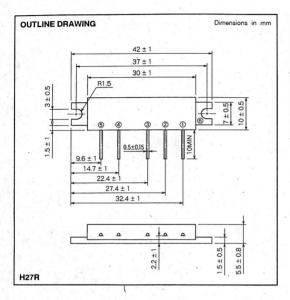
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	Supply voltage		15	V	
V _{BB}	Supply Voltage		5.5	V	
lcc	Total current		4	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W	
Tc(op)	Operation case temperature		-30~110	℃	
Tstg	Storage temperature		- 40~110	20	

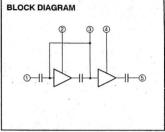
Symbol	Parameter	Test conditions	Limits		1100
-,	Taranteter	rest conditions	Min	Max	Unit
f	Frequency range		150	174	MHz
Po	Output power	Pin = 20mW VBB = 5V Vcc = 12.5V Zc = ZL = 50 Ω	7	The Action	W
ηт	Total efficiency		45	g seed to the	%
2fo	2nd. harmonic		Contraction of the	- 20	dB
3fo	3rd. harmonic			- 25	dB
Pin	Input VSWR			2.5	-
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC2} = 13.2 V, \ V_{BB} = 5 V \\ P_{0} = 7 W \ (V_{CC1} : control \ \ ed) \ P_{in} = 20 mW \\ Load \ VSWR = 20:1 \ (All \ phase), \ 2 sec. \\ Z_{G} = 50 \Omega \end{array} $	No degradation		_



M67748HR

150~174MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCCI : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

(B) GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

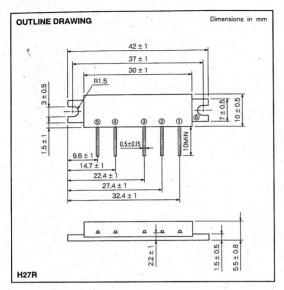
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc .	Supply voltage		15	V	
Vвв	Supply voltage		5.5	V	
lcc	Total current		4	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W	
TC(OP)	Operation case temperature		- 30~110	℃	
Tstg	Storage temperature		- 40~110	°C	

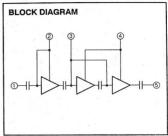
Symbol	Parameter	Test conditions	Limits		11.11
	r al arrieter	rest conditions	Min	Max	Unit
f	Frequency range	150	174	MHz	
Po	Output power	P _{in} = 20mW V _{BB} = 5V V _{CC} = 12.5V	7		W
ηт	Total efficiency		45	C	' %
2fo	2nd. harmonic			- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	1000	- 25	dB
ρ in	Input VSWR			2.5	-
_	Load VSWR tolerance	$\begin{array}{l} \text{Vcc2} = 13.2\text{V}, \; \text{VaB} = 5\text{V} \\ \text{Po-TM}(\text{Vcc1:controlled}) \; \text{Pin=20mW} \\ \text{Load VSWR=20:1} \; (\text{All phase}), \; \text{2sec.} \\ Z_G = 50 \; \Omega \end{array}$	No degradation		-



M67749SLR

335~360MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2 : 2nd. DC SUPPLY
⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

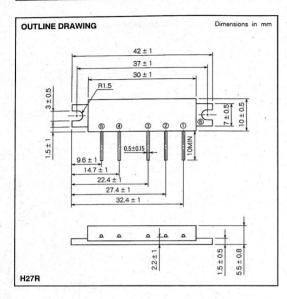
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	6	V _{BB} ≤ 5V	16	· V
V _{BB}	Supply voltage	Vcc ≤ 12.5V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	Z _G = Z _L = 50 Ω	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		- 40~110	°C

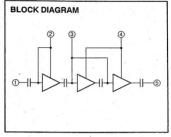
Symbol	Parameter	Test conditions	Limits		11-4
Symbol	Falameter	rest conditions	Min	Max	Unit
f	Frequency range	335	360	MHz	
Po	Output power	Pin = 20mW VBB = 5V VCC = 12:5V	7	**	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic		1000	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
pin .	Input VSWR		1. 1. 1. 1. 1.	2.5	# - X
÷	Load VSWR tolerance	$ \begin{array}{llllllllllllllllllllllllllllllllllll$			- SA -



M67749ULR

360~390MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
①Pin:RF INPUT
②VCC1:1st.DC SUPPLY
③VBB:BASE BIAS
④VCc2:2nd.DC SUPPLY
⑤PO:RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

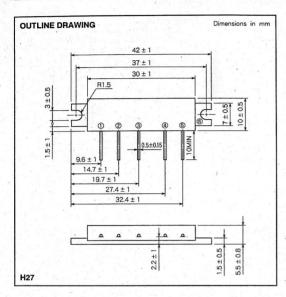
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	C _ I _ It	V _{BB} ≤ 5V	16	V	
V _{BB}	Supply voltage	Vcc ≦ 12.5V	6	V	
lcc	Total current		4	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W	
Tc(op)	Operation case temperature		-30~110	℃	
Tstg	Storage temperature		-40~110	°C	

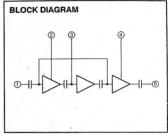
Symbol	Parameter	Test conditions	Limits		11.10
Oyillbui	Farameter	Test conditions	Min	Max	Unit
f	Frequency range		360	390	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V V _{CC} = 12.5V	7	100/100	W
ηт	Total efficiency		38		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			2.5	V-19-1
. t	Load VSWR tolerance	$\begin{array}{l} V_{CC2}\!=\!13.2V,\;V_{BB}\!=\!5V,\;P_{In}=20mW\\ P_{O}=7W\;\;(V_{CC1}:controlled)\\ Load\;\;VSWR\!=\!20:1\;(All\;\;phase),\;\;2sec.\\ Z_{G}=50\Omega \end{array}$			=



M67749L

400~430MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1nd. DC SUPPLY ③VBB: BASE BIAS

⊕VCC2 : 2nd. DC SUPPLY

⑤Po : RF OUTPUT

@GND : FIN

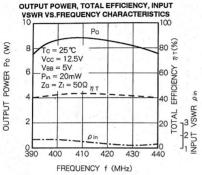
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

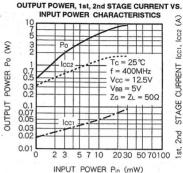
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	C	V _{BB} ≤ 5V	16	V	
VBB	Supply voltage	Vcc ≤ 12.5V	6	. V	
lcc	Total current	그 이 하는 아이들이 있다.	4	Α	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W	
Tc(op)	Operation case temperature		- 30~110	℃ .	
Tstg	Storage temperature		-40~110	℃	

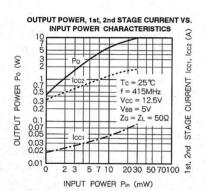
Symbol	Parameter	Test conditions	Limits		Variable.
Cymbol	r al allietel	rest conditions	Min	Max	Unit
f	Frequency range		400	430	MHz
Po	Output power	Pin = 20mW VBB = 5V Vcc = 12.5V ZG = ZL = 50 Ω	7	A SHIP OF	W
ηт	Total efficiency		35		%
2fo	2nd. harmonic		NY LIE YE	- 25	dB
3fo	3rd. harmonic		4000 150	- 30	dB
p in	Input VSWR			2.5	N
_	Load VSWR tolerance	$\begin{array}{l} \mbox{Vcc2} = 13.2\mbox{V}, \mbox{VBB} = 5\mbox{V} \mbox{ Pin} = 20\mbox{mW} \\ \mbox{Po} = 7\mbox{W} \mbox{ (Vcc1}: controlled) \\ \mbox{Load VSWR-20:1 (All phase)}, \mbox{ 2sec.} \\ \mbox{Zg} = 50\mbox{\Omega} \end{array}$			<u>.</u>

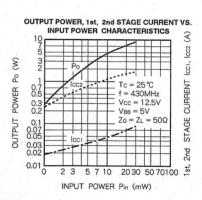
400~430MHz, 12.5V, 7W, FM PORTABLE RADIO

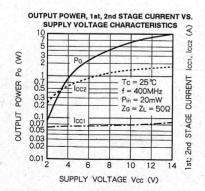
TYPICAL PERFORMANCE DATA

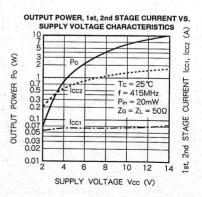








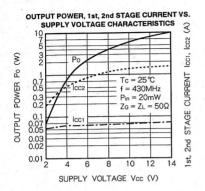


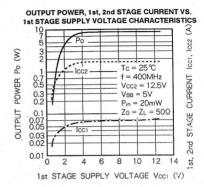


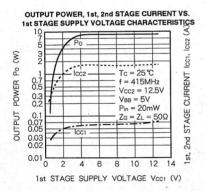


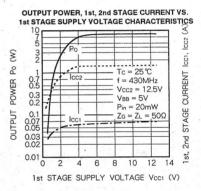
M67749L

400~430MHz, 12.5V, 7W, FM PORTABLE RADIO



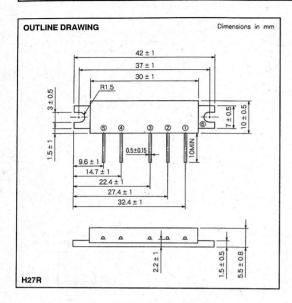


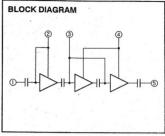




M67749LR

400~430MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

Pin : RF INPUT

②VCC1: 1st. DC SUPPLY

③VBB : BASE BIAS

④VCC2: 2nd. DC SUPPLY

⑤PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	Supply voltage	V _{BB} ≤ 5V	16	V	
V _{BB}	Supply Voltage	Vcc ≤ 12.5V	6	V	
lcc ·	Total current		4	Δ	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W	
Tc(op)	Operation case temperature		-30~110	%	
Tstg	Storage temperature		-40~110	20	

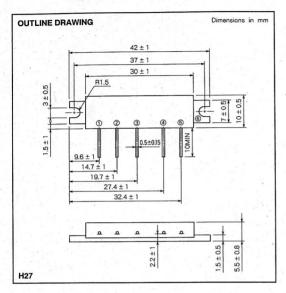
ELECTRICAL CHARACTERISTICS (T_C = 25 ℃ unless otherwise noted)

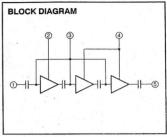
Symbol	Parameter	Test conditions	Limits		F 4
		rest conditions	Min	Max	Unit
f	Frequency range		400	430	MHz
Po	Output power	Pin = 20mW VBB = 5V Vcc = 12.5V	7	N 198	W
ηт	Total efficiency		38	10 1 1 1 1	%
2fo	2nd. harmonic		- 00	- 25	dB
3fo	3rd. harmonic	Z _G = Z _L = 50 Ω	770 7 2 - 70	- 30	· dB
Pin	Input VSWR		W. S	2.5	· OB
_	Load VSWR tolerance	Vcc2=13.2V, VaB=5V, Pin = 20mW Po = 7W (Vcc1 : controlled) Load VSWR=20:1 (All phase), 2sec. Zc = 50Ω			-



M67749M

430~450MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2 : 2nd. DC SUPPLY
⑥ PO : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

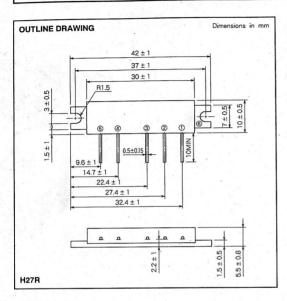
Symbol	Parameter '	Conditions	Ratings	Unit
Vcc	0 1	V _{BB} ≤ 5V	16	V
VBB	Supply voltage	Vcc ≤ 12.5V	6	V
lcc	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power !	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	°C

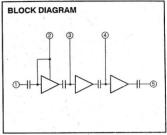
Symbol	Parameter	Test conditions	Limits		11-14
Зуппоог	rarameter	Test conditions	Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V V _{CC} = 12.5V	7		W
ηт.	Total efficiency		40	David Land	%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR	I (최고) 설계되었다.		2.5	.
-	Load VSWR tolerance	$ \begin{array}{l} V_{CC2}\!=\!13.2V,\ V_{BB}\!=\!5V,\ P_{in}=20mW\\ Po=7W\ (Vcc::controlled)\\ Load\ VSWR-20:1(AII\ phase),\ 2sec.\\ Z_G=50\Omega \end{array} $	No degradation		_



M67749MR

430~450MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCCI : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT ⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

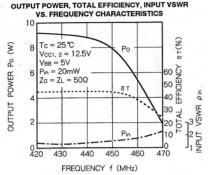
Symbol	Parameter	Conditions	Ratings	Unit
Vcc		V _{BB} ≤ 5V	16	V
VBB	Supply voltage	Vcc ≦ 12.5V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

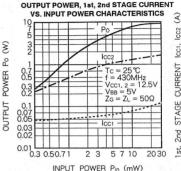
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V V _{CC} = 12.5V	7		W
ηТ	Total efficiency		38		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic .	$Z_G = Z_L = 50 \Omega$		- 30	dB
ρ in	Input VSWR			2.5	
_	Load VSWR tolerance	$\begin{array}{l} \text{Vcc2} = 13.2\text{V}, \text{ VBB} = 5\text{V}, \text{ Pin} = 20\text{mW} \\ \text{Po} = 7\text{W} \text{ (Vcc1: controlled)} \\ \text{Load VSWR=20:1(AII phase), 2sec.} \\ \text{Zg} = 50\Omega \end{array}$	No degradation		=

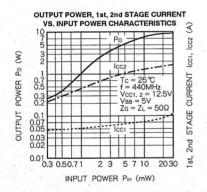


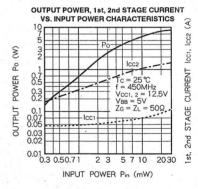
430~450MHz, 12.5V, 7W, FM PORTABLE RADIO

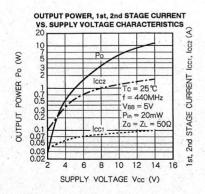
TYPICAL PERFORMANCE DATA

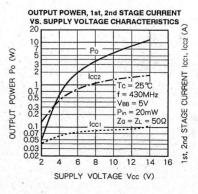






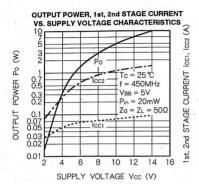


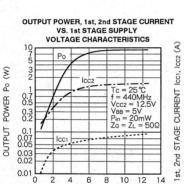




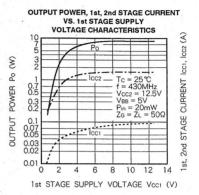
M67749MR

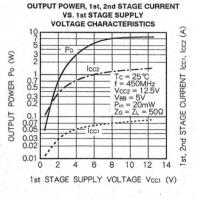
430~450MHz, 12.5V, 7W, FM PORTABLE RADIO





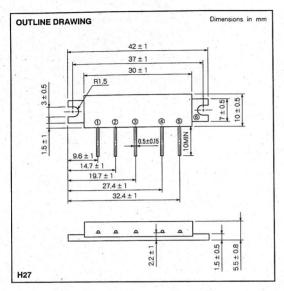
1st STAGE SUPPLY VOLTAGE Vcc1 (V)

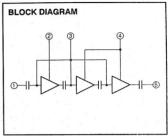




M67749H

440~470MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB: BASE BIAS
④ VCC2: 2nd. DC SUPPLY
⑤ PO: RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

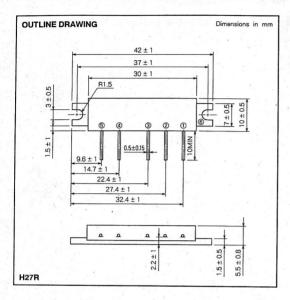
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	0	V _{BB} ≤ 5V	16	V
Vвв	Supply voltage	Vcc ≤ 12.5V	6	V 1
lcc	Total current		4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	℃

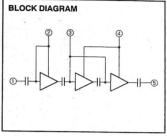
Symbol	Parameter	Test conditions	Limits		11-74
		l'est conditions	Min	Max	Unit
f	Frequency range	P _{In} = 20mW VaB = 5V Vcc = 12.5V	440	470	MHz
Po	Output power		7		W
ηт	Total efficiency		38		%
2fo	2nd. harmonic		4.000	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	A. S. L. Mark	- 30	dB
Pin	Input VSWR			2.5	3 -
_	Load VSWR tolerance	V_{CC2} =13.2V, V_{BB} =5V, P_{In} =20mW P_{O} =7W (V_{CC1} : controlled) Load VSWR=20:1(AII phase), 2sec. Z_{G} =50Q	No degradation		_



M67749HR

440~470MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT ②VCC1: 1st. DC SUPPLY ③ VBB : BASE BIAS @Vcc2 : 2nd. DC SUPPLY ®Po : RF OUTPUT ®GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

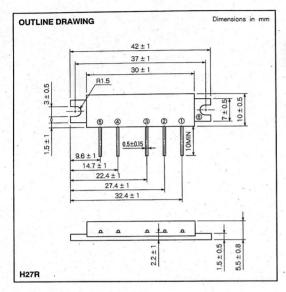
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage	V _{BB} ≤ 5V	16	V
V _{BB}	Supply Voltage	Vcc ≤ 12.5V	6	V
lcc	Total current		4	^
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

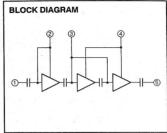
Symbol	Parameter	Test conditions	Limits		100
		Test conditions	Min	Max	Unit
1	Frequency range		440	470	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V	7		W
ηT	Total efficiency		38	100	%
2fo	2nd. harmonic	Vcc = 12.5V		- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	1 100	- 30	dB
Pin	Input VSWR			2.5	OB.
<u>-</u> 28	Load VSWR tolerance	Vcc2=13.2V, VBB=5V, Pin = 20mW Po = 7W (Vcc1: controlled) Load VSWR=20:1(All phase), 2sec. Zc = 50Q	No degradation		



M67749UHR

470~490MHz, 12.5V, 7W, FM PORTABLE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VBB: BASE BIAS
④ VCC2: 2nd. DC SUPPLY
⑤ Po: RF OUTPUT
⑥ GND: FIN

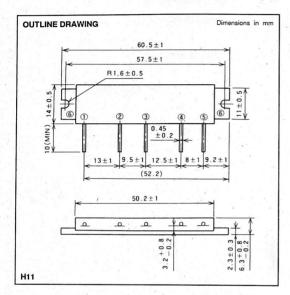
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

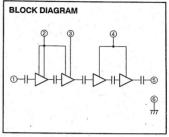
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	6 1 1	V _{BB} ≤ 5V	16	V
Vвв	Supply voltage	Vcc ≤ 12.5V	6	V
lcc	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	40	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		- 40~110	℃

Symbol	Parameter	Test conditions	Limits		1154
			Min	Max	Unit
f	Frequency range	P _{in} = 20mW Vas = 5V Vcc = 12.5V Zσ = ZL = 50 Ω	470	490	MHz
Po	Output power		7		W
ητ	Total efficiency		38		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic			- 30	dB
ρ in	Input VSWR			2.5	
_	Load VSWR tolerance	$\begin{array}{l} V_{CC2}\!=\!13.2V,\ V_{BB}\!=\!5V,\ P_{in}=20mW\\ Po=7W\ (V_{CC1}:controlled)\\ Load\ VSWR=20:1\ (All\ phase),\ 2sec.\\ Z_G=50\Omega & . \end{array}$	No degradation		Ž 1 =



824~849MHz, 12.5V, 6W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

@VCC1: 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY

⊕ VCC3 : 3rd. DC SUPPLY 6Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2	Supply voltage		9	V
Vccз	Supply Voltage		17	V
Icc	Total current		4	Δ
Pin(max)	Input power	f=824~849MHz, Vcc1≤8V, Zg=ZL=50Ω	10	mW
Po(max)	Output power	Ditto	10	W
Tc(op)	Operation case temperature		-30~110	90
Tstg	Storage temperature		-40~110	90

Symbol	Parameter	Test conditions	Limits		1 3 3 3
		rest conditions	Min	Max	Unit
f /	Frequency range	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V	824	849	MHz
Po	Output power	Pin = 1 mW, $Z_G = Z_L = 50 \Omega$	6	1 1 1 1 1 1	W
η T	Total efficiency	Vcc1=8V, Po=6W(Vcc2: controlled)		494	%
2fo	2nd. harmonic	Vcc3 = 12.5V,Pin = 1mW		- 30	dB
Pin	Input VSWR	$Z_G = Z_L = 50 \Omega$		2.5	-
-	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V Po = 6W(Vcc2 : controlled) Pin = 1 mW Load VSWR-20:1(All phase), 5sec.	No degradation		

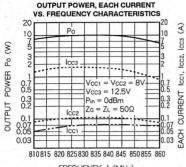


CC3 (A)

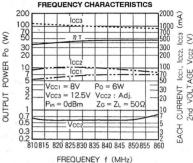
CC2

824~849MHz, 12.5V, 6W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA



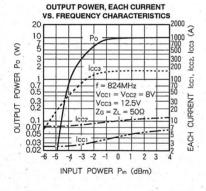
TOTAL EFFICIENCY, EACH CURRENT 2nd VOLTAGE VS.

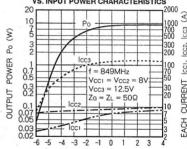


FREQUENEY f (MHz)

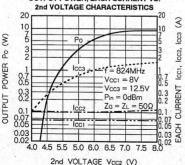






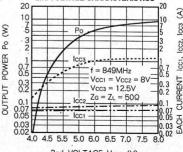


OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS 20



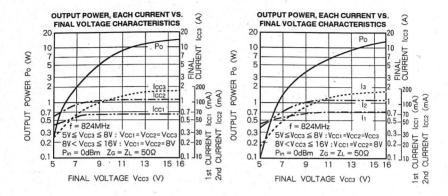
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS

INPUT POWER Pin (dBm)



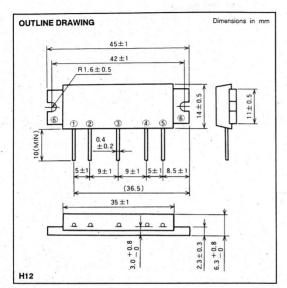
2nd VOLTAGE Vcc2 (V)

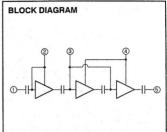
824~849MHz, 12.5V, 6W, FM MOBILE RADIO



M67755L

134~150MHz, 7.2V, 7W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VBB : BASE BIAS ④ VCC2 : 2nd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

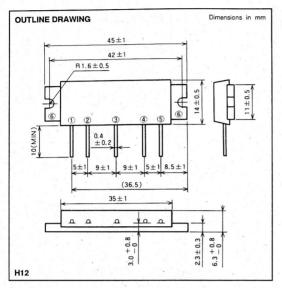
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Cuanti valtana		10	V
VBB	Supply voltage		7	V
lcc	Total current		4	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω	4	mW
Po(max)	Output power	Z _G = Z _L = 50 Ω	10	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	℃

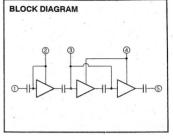
Symbol	Parameter	Test conditions	Lir	11.7	
Cymbol	1 di airietei	rest conditions	Min .	Max	Unit
f	Frequency range	P _{In} = 2mW V _{BB} = 5V V _{CC} = 7.2V	134	150	MHz
Po	Output power		7	47	W
ηт	Total efficiency		40		%
2fo	2nd. harmonic			- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
Pin	Input VSWR			3.5	
_:	Load VSWR tolerance	Vcc = 9V, VBB = 5V Po = 7W (Pin: controlled) Load VSWR=20:1 (All phase), 2sec. $Z_G = 50 \Omega$	No degradation		-



M67755H

150~174MHz, 7.2V, 7W, FM PORTABLE RADIO





PIN:

①Pin: RF INPUT ②VCC1: 1st. DC SUPPLY ③VBB: BASE BIAS ④VCC2: 2nd. DC SUPPLY ⑤PO: RF OUTPUT ⑥GND: FIN

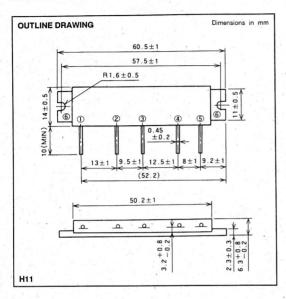
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

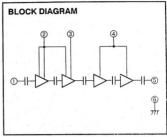
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	C. and altana		9.2	V
VBB	Supply voltage		5.5	V
lcc ·	Total current		4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	4	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(OP)	Operation case temperature		- 30~110	~
Tstg	Storage temperature		- 40~110	°C

Symbol	Parameter	Test conditions	Limits		1. 160
Cymbol	i arameter	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 2mW. VBB = 5V	150	174	MHz
Po	Output power		7		W
ηт	Total efficiency		40	Water Barrier	%
2fo	2nd. harmonic	Vcc = 7,2V	40	- 25	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 30	dB
<i>p</i> in	Input VSWR		100	3.5	10 pe 1 22 1
200	Load VSWR tolerance	$ \begin{array}{l} \mbox{Vcc} = 9\mbox{V}, \mbox{VBB} = 5\mbox{V} \\ \mbox{Po} = 7\mbox{W} \ (\mbox{Pin}: controlled) \\ \mbox{Load VSWR-20:1 (All phase), 2sec.} \\ \mbox{Zg} = 50 \ \Omega \\ \end{array} $	No degradation		-



872~905MHz, 12.5V, 6W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

④ VCC3 : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT

(5) PO : RF OUT (6) GND : FIN

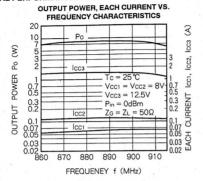
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

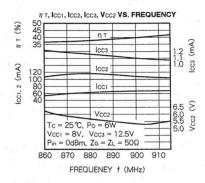
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2	0 1		9	V
Vcc3	Supply voltage		17	V
lcc :	Total current		4	A
Pin(max)	Input power	f=872~905MHz, Vcc1 ≤ 8V, Zg=ZL=50 Ω	10	mW
Po(max)	Output power	Ditto	10	W
Tc(op)	Operation case temperature		-30~110	℃
Tstg	Storage temperature		-40~110	℃

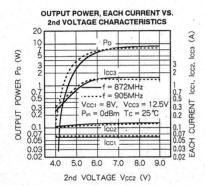
Symbol	Parameter	Test conditions	Limits		Unit
Symbol	rarameter	lest conditions	Min	Max	Unit .
f	Frequency range	Vcc1 = Vcc2 = 8V, Vcc3 = 12.5V	872	905	MHz
Po	Output power	$P_{in} = 1 \text{mW}, Z_G = Z_L = 50 \Omega$	6		W
ηт	Total efficiency	Vcc1 = 8V, Po = 6W (Vcc2 : controlled) Vcc3 = 12.5V, Pin = 1 mW,	35		%
2fo	2nd. harmonic		SYSTEM SIZE	- 30	dB
<i>p</i> in	Input VSWR	$Z_G = Z_L = 50 \Omega$		2.5	-
-	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V, Po = 6W(Vcc2 : controlled) Pin = 1 mW Load VSWR-20:1 (AII phase), 5sec.	No degradation		_

872~905MHz, 12.5V, 6W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

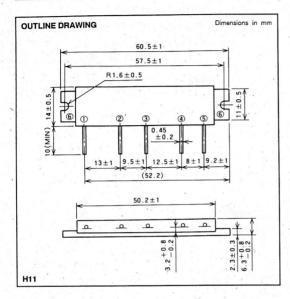


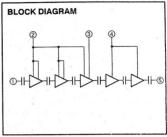






893~901MHz, 7.2V, 7W, FM PORTABLE RADIO





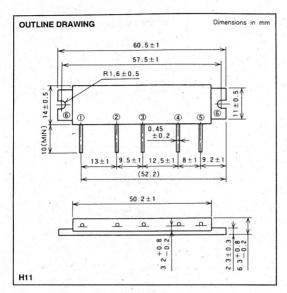
PIN:
①Pin::RF INPUT
②VCCI::1st. DC SUPPLY
③VCC2::2nd. DC SUPPLY
④VCC3::3rd. DC SUPPLY
⑥PO::RF OUTPUT
⑥GND::FIN

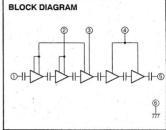
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2, 3	Supply voltage		9, 2	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	Α
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	7	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	9	W
Tc(op)	Operation case temperature	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	- 30~100	℃
Tstg	Storage temperature		-40~110	°C

C b - 1	D	T-14	Limits		11.00
Symbol	Parameter	Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 1mW Vcc1 = Vcc2 = Vcc3 = 7.2V Z _G = Z _L = 50 Ω	893	901	MHz
Po	Output power		7		W
ηт	Total efficiency		35	in a said	%
2fo	2nd. harmonic			- 30	dBc
3fo	3rd. harmonic	20 - 21 - 30 %		- 30	dBc
Pin	Input VSWR			2.5	
	Load VSWR tolerance	$V_{CC2} = V_{CC3} = 9.2V$, $P_0 = 7W$ (V_{CC1} : controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50 \Omega$	No degradation in output power		_

940~960MHz, 12.5V, 8W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vccı			9	. V
Vcc2	Supply voltage		14	V
Vccз			17	V
lcc	Total current		4	A
Pin(max)	Input power	Z _G = Z _L = 50 Ω, V _{CC1} ≤ 8V	7	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	12	W
Tc(op)	Operation case temperature		-30~110	°C
Tstg	Storage temperature		-40~110	°C

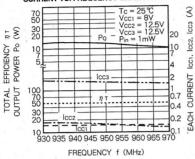
Symbol Parameter	Parameter	Test conditions	Limits		2000
	1 alameter	rest conditions	Min	Max	Unit
f	Frequency range		940	960	MHz
Po	Output power .	Vcc1 = 8V Vcc2 = Vcc3 = 12.5V Pin = 1mW	8	140,000,000	W
ηт	Total efficiency		35		%
2fo	2nd. harmonic	Z _G = Z _L = 50 Q	156.554	- 30	dB
p in	Input VSWR	20 - 21 - 30 \$2	The state of the s	2.8	
-	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V Po = 8W (Vcc2 : controlled) Pin = 1mW Load VSWR=20:1 (All phase), 5sec.	No degradation		-

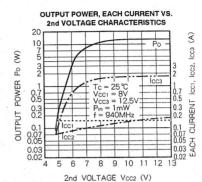


940~960MHz, 12.5V, 8W, FM MOBILE RADIO

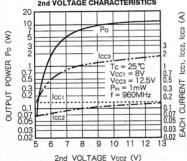
TYPICAL PERFORMANCE DATA

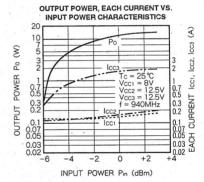
TOTAL EFFICIENCY, OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



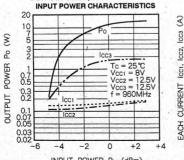


OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS





OUTPUT POWER, EACH CURRENT VS.





3

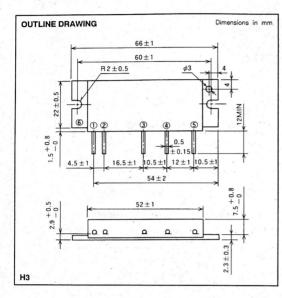
lcc3

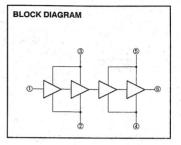
lcc2,

lcc1,

M67766A

824~849MHz, 12.5V, 6.0W, MOBILE RADIO





PIN:

①Pin : RF INPUT

②VBB1:1st. BASE BIAS SUPPLY ③VCC1:1st. COLLECTOR BIAS SUPPLY ④VBB2:2nd. BASE BIAS SUPPLY

⑤ VCC2 : 2nd. COLLECTOR BIAS SUPPLY ⑥ PO : RF OUTPUT

GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1	1st. Collector bias supply voltage	$Z_G = Z_L = 50 \Omega$, $V_{BB1} = 8V$	9	V
Vcc2	2nd. Collector bias supply voltage	$Z_G = Z_L = 50 \Omega$, $V_{BB2} = 8V$	17	V
V _{BB1}	1st. Base bias supply voltage	$Z_G = Z_L = 50 \Omega$, $V_{CC1} = 8V$	9	V
V _{BB2}	2nd. Base bias supply voltage	$Z_G = Z_L = 50 \Omega$, $V_{CC2} = 12.5V$	9	V
lcc1	1st. Collector DC current	$Z_G = Z_L = 50 \Omega$	300	mA
Icc2	2nd. Collector DC current	$Z_G = Z_L = 50 \Omega$	2	A
lee1	1st. Base DC current	Zg = ZL = 50 Ω	200	33.000
IBB2	2nd. Base DC current	Z _G = Z _L = 50 Ω	300	mA
Pi(av)	Average input power	$Z_G = Z_L = 50 \Omega$, $V_{CC2} = 12.5V$	4	mW
Pi(pk)	Peak input power	$Z_G = Z_L = 50 \Omega$, $V_{CC2} = 12.5V$	10	mW
Po(av)	Average output power	$Z_G = Z_L = 50 \Omega$, $V_{CC2} = 12.5V$	10	W
Po(pk)	Peak output power	$Z_G = Z_L = 50 \Omega$, $V_{CC2} = 12.5V$	20	W
Tc(op)	Operation case temperature	Z _G = Z _L = 50 Ω	-30~100	% W
Tstg	Storage temperature		-30~100	20



M67766A

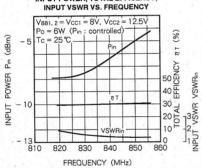
824~849MHz, 12.5V, 6.0W, MOBILE RADIO

ELECTRICAL CHARACTERISTICS (Tc = 25 °C unless otherwise noted)

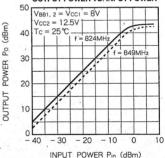
Symbol		T	Limits		Unit
	Parameter	Test conditions	Min	Max	Offit
f	Frequency range	Pragrama in the second	824	849	MHz
Po(pk)	Peak output power	$P_{I(pk)} = 2mW$, $V_{BB1} = V_{BB2} = 8V$, $V_{CC2} = 12.5V$, $Z_G = Z_L = 50\Omega$	12.5		W
Pi(av)	Average output power			1	mW
ηТ	Total efficiency	V _{BB1} = V _{CC1} = V _{BB2} = 8V,	20		%
2fo	2nd. harmonic	Vcc2 = 12.5V, Po = 6.0W (Pin : controlled)	9	- 30	dBc
3fo	3rd, harmonic	$Z_G = Z_L = 50\Omega$		- 30	dBc
VSWRin	Input VSWR	26-21-30%		3:1	-
IMD3	3rd, IMD	VBB1=Vcc1=VBB2=8V, Vcc2=12, 5V,		- 24	dBc
IMD5	5th, IMD	Po(av) = 6.0W (Pin : controlled),		- 32	dBc
IMD7	7th, IMD	$\Delta f = 10kHz$, 2 tone, $Z_G = Z_L = 50\Omega$		- 38	dBc
-	Load VSWR tolerance	$\begin{array}{c} V_{BB1} = V_{CC1} = V_{BB2} = 8V, \ V_{CC2} = 15V, \\ P_O = 6.0W \ (P_{in}: controlled) \\ Load \ VSWR=20:1 \ (All\ phase), 2sec. \\ Z_G = 50 \ \Omega \end{array}$	No degradation in output power		-

TYPICAL PERFORMANCE DATA

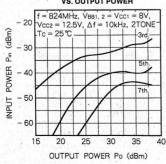
INPUT POWER, TOTAL EFFICENCY,



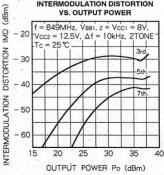
OUTPUT POWER VS. INPUT POWER



INTERMODULATION DISTORTION **VS. OUTPUT POWER**

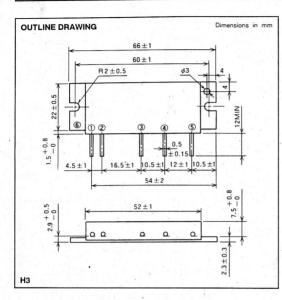


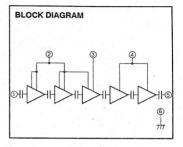
INTERMODULATION DISTORTION VS. OUTPUT POWER



M67769C

890~915MHz, 12.5V, 13W, FM MOBILE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY ⑤ PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc1			9	V
Vcc2	Supply voltage		15	V
Vccз			17	V
lcc	Total current		5	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8V$	4	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	20	W
Tc(op)	Operation case temperature		- 30~110	20
Tstg	Storage temperature		-40~110	%

Symbol	Parameter	Test conditions	Limits		
0,111001	1 arameter	rest conditions	Min	Max	Unit
f	Frequency range		890	915	MHz
Po	Output power	Vcc1 = 8V	13	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	W
ηт	Total efficiency	Vcc2 = Vcc3 = 12.5V Pin = 1mW	30	The second	%
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	A TOTAL PROPERTY.	- 30	dB
ρ in	Input VSWR	26 - 26 - 50 \$2		2.8	-
-	Load VSWR tolerance	Vcc1 = 8V, Vcc3 = 15.2V Po = 13W (Vcc2 : controlled) Pin = 1mW Load VSWR=20:1 (All phase), 5sec.	No degradation		-



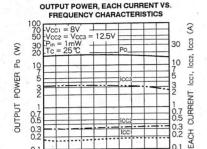
3

890~915MHz, 12.5V, 13W, FM MOBILE RADIO

TYPICAL PERFORMANCE DATA

0.1

890



900 FREQUENCY f (MHz) 0.1

915

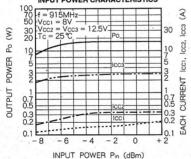
OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS 100 70 50 3 -f = 890MHz $-V_{CC1} = 8V$ Vcc2 = Vcc3 = 12.5V Tc = 25 °C CC3 30 3 30 lcc2, Po 10 10 5 POWER Icc1. 5 Icc 3 3 CURRENT OUTPUT 0.7 0.7 0.3 0.3 icc 0. 0.1 8 - 6 2 - 4

INPUT POWER Pin (dBm)

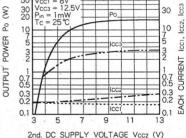
OUTPUT POWER, EACH CURRENT VS.

2nd. DC SUPPLY VOLTAGE

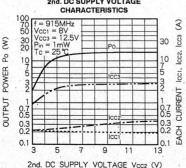
OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



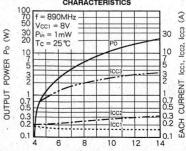
CHARACTERISTICS 100 70 50 f = 890MHz $V_{CC1} = 8V$ Vcc3 = 12.5 30 Pin = 1mW Tc = 25 °C Po 19 POWER 5



OUTPUT POWER, EACH CURRENT VS. 2nd. DC SUPPLY VOLTAGE



OUTPUT POWER, EACH CURRENT VS. 2nd and 3rd DC SUPPLY VOLTAGE CHARACTERISTICS

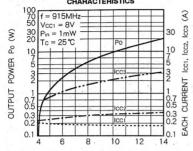


2nd and 3rd DC SUPPLY VOLTAGE Vcc2 = Vcc3 (V)

M67769C

890~915MHz, 12.5V, 13W, FM MOBILE RADIO

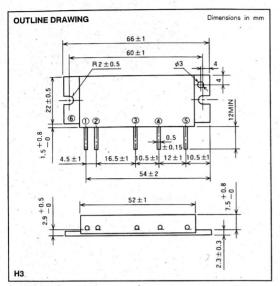
OUTPUT POWER, EACH CURRENT VS. 2nd and 3rd DC SUPPLY VOLTAGE CHARACTERISTICS

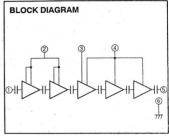


2nd and 3rd DC SUPPLY VOLTAGE Vcc2 = Vcc3 (V)



1465~1477MHz, 13.5V, 7.5W, FM MOBILE RADIO





PIN:
①Pin : RF INPUT
②VCCI: 1st. DC SUPPLY
③VBB : BASE BIAS DC SUPPLY
④VCC2: 2nd. DC SUPPLY
⑤PO : RF OUTPUT

6GND : FIN

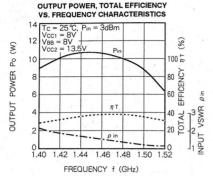
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

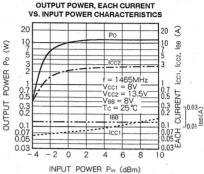
Symbol	Parameter	Conditions	Ratings	Unit
Vccı			9	V
Vcc2	Supply voltage		16	V
VBB			8.5	V
lcc	Total current		4	A
Pin(max)	Input power	. Vcc1 ≤ 8V, Z _G = Z _L = 50 Ω	5	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	10	W
Tc(op)	Operation case temperature		- 30~90	°C
Tstg	Storage temperature		- 40~110	°C

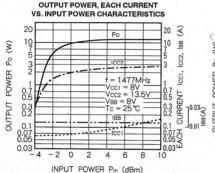
Symbol Parameter	D		Limits		
	rarameter	Test conditions	Min	Max	Unit
f	Frequency range	Vcc1 = 8V VBB = 8V Vcc2 = 13.5V Pin = 2mW	1465	1477	MHz
Po	Output power		7.5	10-27-201	W
ήΤ	Total efficiency		30		%
2fo .	2nd. harmonic			- 25	dB
P in	Input VSWR	$Z_G = Z_L = 50 \Omega$		2.8	-
_	Load VSWR tolerance	VBB = 8V, VCC2 = 15.2V Po = 8W (VCC1 : controlled) Pin = 2mW Load VSWR=10:1(AII phase), 5sec.	No degradation		-

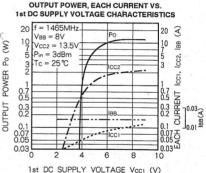
1465~1477MHz, 13.5V, 7.5W, FM MOBILE RADIO

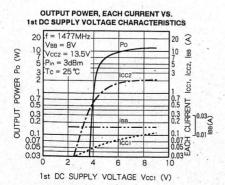
TYPICAL PERFORMANCE DATA







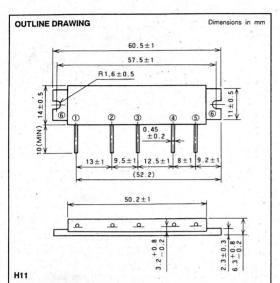


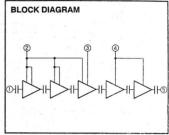




M67776L

806~870MHz, 7.2V, 5.0W, FM PORTABLE RADIO





PIN:

①Pin:: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO:: RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

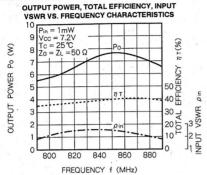
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2, 3	Supply voltage		9.2	V
Icc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	4	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	8	W
Tc(op)	Operation case temperature	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	- 30~110	%
Tstg	Storage temperature		- 40~110	°C

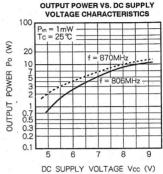
Symbol	Parameter	Test conditions	Limits		
	- Talamoto	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 1 mW Vcc1 = Vcc2 = Vcc3 = 7.2V ZG = ZI = 50 Q	806	870	MHz
Po	Output power		5		W
ηт	Total efficiency		30	30000	%
2fo	2nd. harmonic		18.4534.65	- 30	dBc
3fo	3rd. harmonic	26 - 21 - 30 %	Ass.	- 30	dBc
ρ in	Input VSWR		To Aust	3.0	-
-	Load VSWR tolerance	$\begin{array}{l} \mbox{Vcc2=Vcc3=9.2V, Po=5.0W (Vcc1 controlled),} \\ \mbox{Load VSWR=20:1 (All phase), 2sec.} \\ \mbox{Zg} = 50 \ \Omega \end{array}$	No degradation in output power		

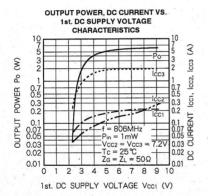


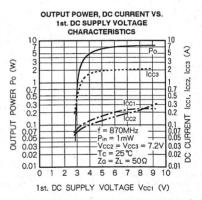
806~870MHz, 7.2V, 5.0W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA



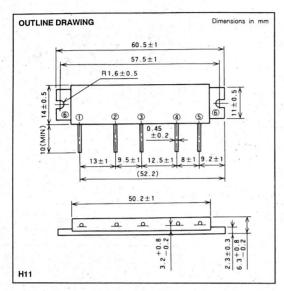


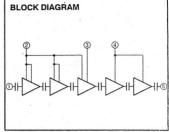




M67776H

896~941MHz, 7.2V, 5.0W, FM PORTABLE RADIO





PIN:

① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCc2: 2nd. DC SUPPLY
④ VCc3: 3nd. DC SUPPLY
⑤ PO: RF OUTPUT
⑥ GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

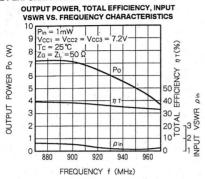
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2, 3	Supply voltage		9.2	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	4	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	4	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	8	W
Tc(op)	Operation case temperature	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 7.2V$	-30~110	°C
Tstg	Storage temperature		- 40~110	℃

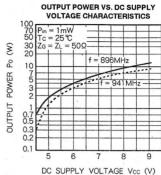
Symbol	Parameter	Test conditions	Limits		11.5
	1 blameter	Test conditions	Min	Max	Unit
f	Frequency range		896	941	MHz
Po	Output power	P _{in} = 1mW Vcc1 = Vcc2 = Vcc3 = 7.2V Z _G = Z _L = 50 Q	5		W
ηт	Total efficiency		30		%
2fo	2nd. harmonic			- 30	dBc
3fo	3rd. harmonic	20-21-30 %		- 30	dBc
Pin	Input VSWR		1.00	3.0	(/ P
-	Load VSWR tolerance	Vcc2=Vcc3=9.2V, Po=5.0W(Vcc1 controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50~\Omega$	No degradation in output power		_

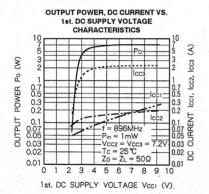


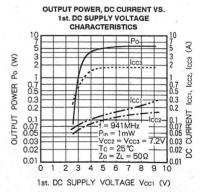
896~941MHz, 7.2V, 5.0W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA



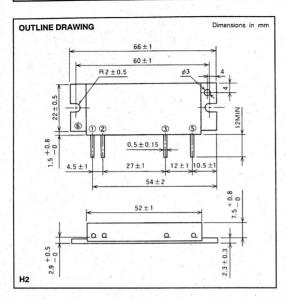


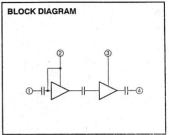




M67781L

135~160MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:

①Pin : RF INPUT

②VCC1: 1st. DC SUPPLY ③VCC2: 2nd. DC SUPPLY

@PO : RF OUTPUT

GOND : FIN

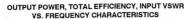
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

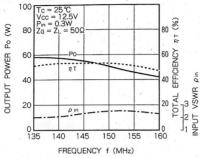
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc1	6 - 1		16	V	
Vcc2	Supply voltage		17	V	
lcc.	Total current		12	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	W	
Tc(op)	Operation case temperature		-30~110	℃	
Tstg	Storage temperature		- 40~110	℃	

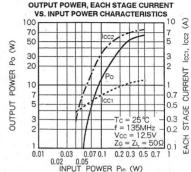
Symbol	Parameter	Test conditions	Limits		Unit
	Faranietei	Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.3W Vcc = 12.5V Z _G = Z _L = 50 Ω	135	160	MHz
Po	Output power		40		W
ηΤ.	Total efficiency		40		%
2fo	2nd. harmonic			- 30	dB
3fo	'3rd. harmonic	26 - 26 - 30 %		- 30	dB
p in	Input VSWR		Car Mari	3.0	-
, - , -	Load VSWR tolerance	Vcc=15.2V,Po=40W(Pin:controlled) Load VSWR=8.8:1 (AII phase), 5sec. Zc = 50 Ω	No degradation		-

135~160MHz, 12.5V, 40W, FM MOBILE RADIO

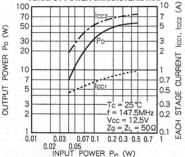
TYPICAL PERFORMANCE DATA

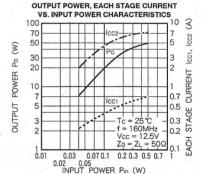




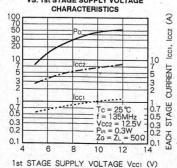


OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS

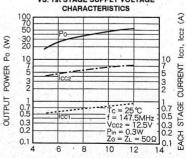




OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE



1st STAGE SUPPLY VOLTAGE Vcc1 (V)

3

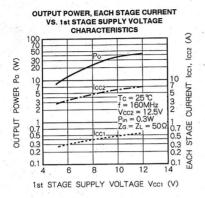
Po

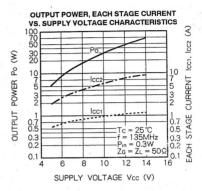
POWER

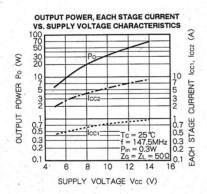
TUTTUC

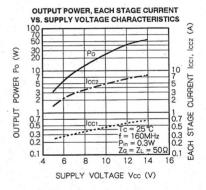
M67781L

135~160MHz, 12.5V, 40W, FM MOBILE RADIO



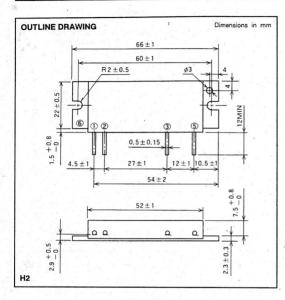


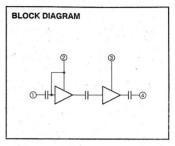




M67781H

150~175MHz, 12.5V, 40W, FM MOBILE RADIO





PIN:
① Pin: RF INPUT
② VCC1: 1st. DC SUPPLY
③ VCc2: 2nd. DC SUPPLY
⑥ PO: RF OUTPUT
⑤ GND: FIN

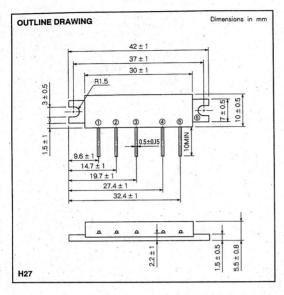
ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

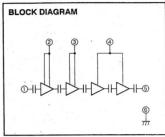
Symbol	Parameter Conditions		Ratings	Unit
Vccı	Const. colta-		16	V
Vcc2	Supply voltage		17	V
Icc	Total current		12	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	0.6	W
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	50	· W
TC(OP)	Operation case temperature		-30~110	20
Tstg	Storage temperature		- 40~110	90

Symbol	Parameter	p	Limits		
0,111001	1 diameter	Test conditions	Min	Max	Unit
f	Frequency range	P _{in} = 0.3W Vcc = 12.5V Zc = 7L = 50 Ω	150	175	MHz
Po	Output power		40		W.
ηT	Total efficiency		40	0.5 A. W. Series (177)	%
2fo	2nd. harmonic			- 30	dB
3fo	3rd. harmonic	$= 2G = 2L = 50 \Omega$		- 30	dB
Pin	Input VSWR		1	3.0	I
7	Load VSWR tolerance	Vcc=15.2V, Po=40W (Pin: controlled) Load VSWR=8.8:1 (All phase), 5sec. Zg = 50 Ω	No degradation		-



1240~1300MHz, 7.2V, 1.4W, FM PORTABLE RADIO





PIN:

①Pin: RF INPUT
②VCC1: 1st. DC SUPPLY
③VCC2: 2nd. DC SUPPLY
④VCC3: 3rd. DC SUPPLY
⑤PO: RF OUTPUT
⑥GND: FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

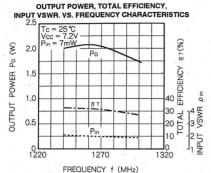
Symbol	Parameter	Conditions	Ratings	Unit
Vcc1, 2	0 1 1		7.5	V
Vcc3	Supply voltage	Vcc1, 2 ≤ 7.2V	15	V
lcc .	Total current		2.5	A
Pin(max)	Input power	Vcc1, 2 ≤ 7.2V, Zg = ZL = 50 Ω	10	mW
Po(max)	Output power	Vcc1, 2 ≤ 7.2V, Z _G = Z _L = 50 Ω	2.5	W
Tc(OP)	Operation case temperature		-20~100	°C
Tstg	Storage temperature		- 40~110	2

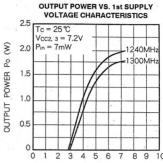
C b-1	Parameter	Test conditions	Limits		Unit
Symbol	Parameter	rest conditions	Min	Max	Unit
f	Frequency range		1240	1300	MHz
Po	Output power	Vcc1 = Vcc2 = Vcc3 = 7.2V	1.4		W
ηт	Total efficiency	Pin = 7mW	20		% .
2fo	2nd. harmonic	$Z_G = Z_L = 50 \Omega$	a language of	- 28	dB
<i>p</i> in	Input VSWR			3.5	=
-	Load VSWR tolerance	$V_{CC1} = 7.2V$, $V_{CC3} = 15V$, $P_{in} = 7mW$ $P_{0}=1.4W$ (V_{CC2} :controlled) $Z_{0}=50\Omega$ Load VSWR=10:1 (All phase), 2sec.	No degradation		-



1240~1300MHz, 7.2V, 1.4W, FM PORTABLE RADIO

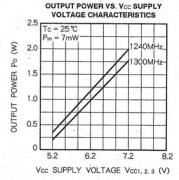
TYPICAL PERFORMANCE DATA



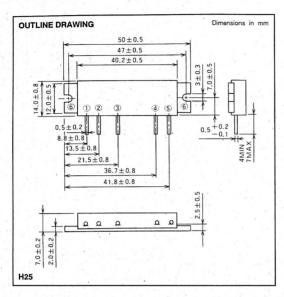


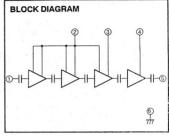
1st SUPPLY VOLTAGE Vcc1 (V)

OUTPUT POWER VS. INPUT POWER CHARACTERISTICS 2.5 Tc = 25 ℃ 1240MH Vcc1=Vcc2=Vcc3=7.2V 8 2.0 OUTPUT POWER Po 1300MHz 1.5 1.0 0.5 0 2 3 4 5 6 7 8 9 10 11 INPUT POWER Pin (mW)



889~915MHz, 9.6V, 3.8W, FM PORTABLE RADIO





PIN:

①Pin : RF INPÚT

②VCC1:1st. DC SUPPLY ③VCC2:2nd. DC SUPPLY

(4) VCC3 : 3rd. DC SUPPLY (5) PO : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit	
Vccı	Cupality violations		8.5	V	
Vcc2, 3	Supply voltage		12	V	
lcc	Total current		3	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8V$	10	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	6	W	
Tc(op)	Operation case temperature		- 30~90	℃	
Tstg	Storage temperature		-40~110	°C	

Symbol Parameter	Parameter	Test conditions	Limits		1154
	1 Blametei	rest conditions	Min	Max	Unit
f	Frequency range	Vcc1 = 8V Vcc2 = Vcc3 = 9.6V Pin = 1mW ZG = ZI = 50 Q	889	915	MHz
Po	Output power		3.8		W
ηт	Total efficiency		35	7.0	%
2fo	2nd. harmonic			- 30	dB
Pin	Input VSWR	25 - 25 - 30 %		2.8	
-	Load VSWR tolerance	Vcc1 = 8V Po = 3.8W (Vcc2 : controlled) Vcc3 = 12V, Pin = 1mW Load VSWR=20:1(AII phase), 2sec.	No degradation		_



33

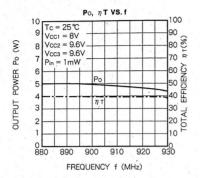
CURRENT In (A

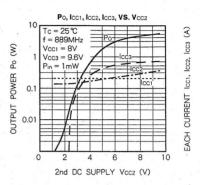
CURRENT

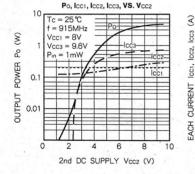
2nd DC

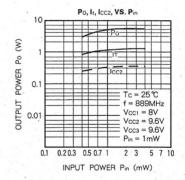
889~915MHz, 9.6V, 3.8W, FM PORTABLE RADIO

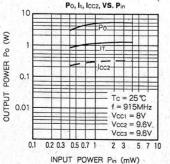
TYPICAL PERFORMANCE DATA





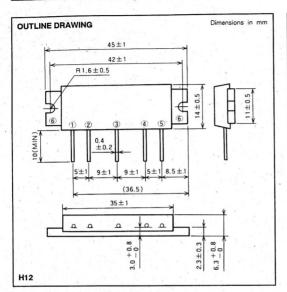


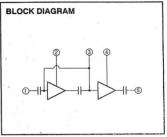




TAL CURRENT IT (A) DC CURRENT Icc2 (A) TOTAL Snd

184~200MHz, 9.6V, 5W, FM PORTABLE RADIO





PIN:

(1) Pin : RF INPUT (2) VCC1 : 1st. DC SUPPLY (3) VBB : BASE BIAS (4) VCC2 : 2nd. DC SUPPLY (5) PO : RF OUTPUT

@GND : FIN

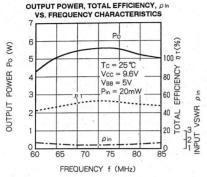
ABSOLUTE MAXIMUM RATINGS (Tc = 25 °C unless otherwise noted)

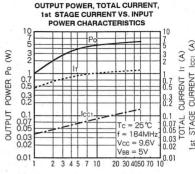
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc			13	V	
VBB	Supply voltage		5.5	V	
lcc	Total current		4	- A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	30	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	7	W	
Tc(OP)	Operation case temperature		-30~110	℃	
Tstg	Storage temperature		-40~110	~ °C	

0 1 1		Test conditions	Limits		Unit
Symbol	Parameter	Test conditions	Min	Max	Orne
f	Frequency range		184	200	MHz
Po	Output power	P _{in} = 20mW V _{BB} = 5V	5		W
ηT	Total efficiency		40		%
2fo	2nd. harmonic	Vcc = 9.6V	Mary Mary	- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$		- 25	dB
Pin	Input VSWR		Carl State	2.5	
	Load VSWR tolerance	$ \begin{array}{l} V_{CC2}=13 \cupV, V_{BB}=5 \cupV, P_{in}=20 \mbox{mW} \\ Po=5 \cupW (V_{CC1}:controlled) \\ Load VSWR=20:1 (All phase), 2 sec. \\ Z_G=50 \cupQ \end{array} $	No degradation		-

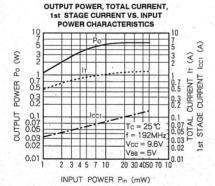


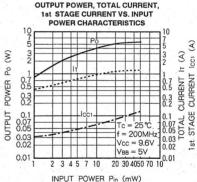
TYPICAL PERFORMANCE DATA

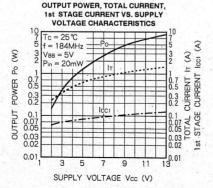


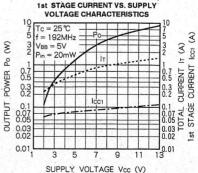


INPUT POWER Pin (mW)



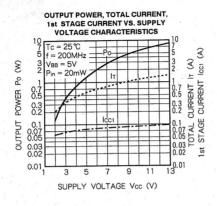


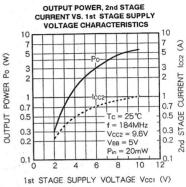


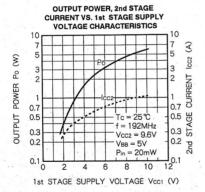


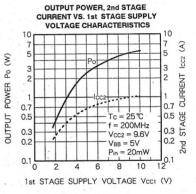
OUTPUT POWER, TOTAL CURRENT,

184~200MHz, 9.6V, 5W, FM PORTABLE RADIO



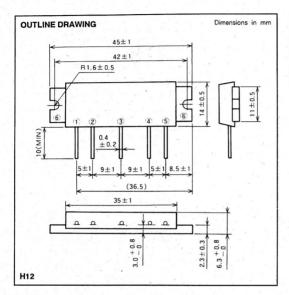


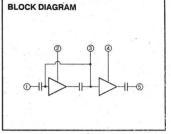




M67785H

220~240MHz, 9.6V, 5W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT @VCC1: 1st. DC SUPPLY 3 VBB : BASE BIAS @ VCC2 : 2nd, DC SUPPLY ⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

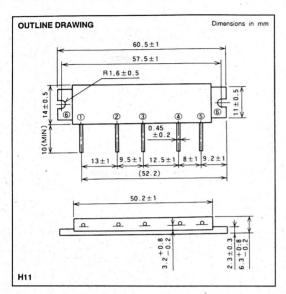
Symbol	Parameter	Conditions	Ratings	Unit	
Vcc	Supply valtage		13	V	
VBB	Supply voltage		5.5	V	
lcc	Total current		4	A	
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$	30	mW	
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	7	W	
TC(OP)	Operation case temperature		-30~110	℃	
Tstg	Storage temperature		-40~110	℃.	

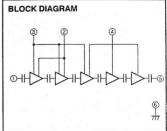
ELECTRICAL CHARACTERISTICS ($T_c = 25 \, ^{\circ}\!\text{C}$ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		
Cymbol	i arameter	rest conditions	Min	Max	Unit
f	Frequency range	Pin = 20mW .Vss = 5V .Vcc = 9.6V	220	240	MHz
Po	Output power		5		W
ηт	Total efficiency		40	THE PARTY	%
2fo	2nd. harmonic		10 M 19 74	- 20	dB
3fo	3rd. harmonic	$Z_G = Z_L = 50 \Omega$	3.41.111	- 25	dB
Pin	Input VSWR			2.5	- 15
_	Load VSWR tolerance	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	No degradation		-



1465~1477MHz, 9.6V, 3W, FM PORTABLE RADIO





PIN:

①Pin : RF INPUT ②VCC1 : 1st. DC SUPPLY ③YBB : BASE BIAS ④VCC2 : 2nd. DC SUPPLY ⑤PO : RF OUTPUT ⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25 ℃ unless otherwise noted)

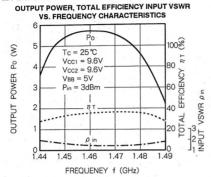
Symbol	Parameter	Conditions	Ratings	Unit
Vccı		V _{BB} ≤ 5.5V	12	V
Vcc2	Supply voltage	Po \leq 5W, VBB \leq 5.5V, Zg' = ZL = 50 Ω	12	V
V _{BB}			5.5	V
lcc	Total current		3	A
Pin(max)	Input power	Vcc1 ≤ 9. 6V, VBB=5V, ZG=ZL=50 Ω	10	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$	5	W
Tc(op)	Operation case temperature		- 30~110	℃
Tstg	Storage temperature		- 40~110	20

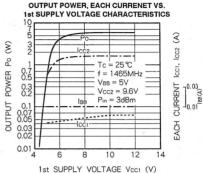
Symbol	Parameter	Test conditions	Limits		11.5
Oymbor	1 aranietei	rest conditions	Min	Max	Unit
f	Frequency range	Vcc1 = 9.6V	1465	1477	MHz
Po .	Output power	Vcc = 5.6V VBB = 5V, Vcc2 = 9.6V.	3		W
ηт	Total efficiency		30	Service of	%
2fo	2nd. harmonic	Pin = 2mW	ALC: COM	- 25	dB
Pin	Input VSWR	$Z_G = Z_L = 50 \Omega$		2.5	455-
-	Load VSWR tolerance	$\begin{array}{l} V_{BB}=5V,\ V_{CC2}=11V\\ Po=3W(V_{CC1},\ controlled)\\ P_{in}=2mW,\ Z_G=50\Omega\\ Load\ VSWR=10:1(All\ phase),\ 5sec. \end{array}$	No degradation		<u>.</u>

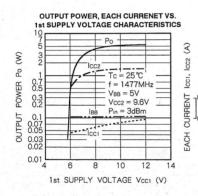


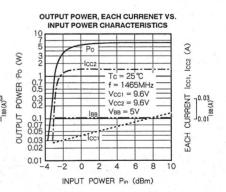
1465~1477MHz, 9.6V, 3W, FM PORTABLE RADIO

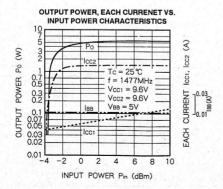




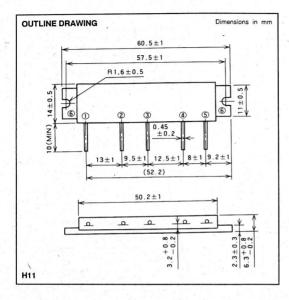


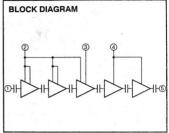






945~951MHz, 8.0V, 4.0W, FM PORTABLE RADIO





PIN:

① Pin : RF INPUT ② VCC1 : 1st. DC SUPPLY ③ VCC2 : 2nd. DC SUPPLY ④ VCC3 : 3rd. DC SUPPLY

⑤Po : RF OUTPUT

@GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = $25\,\%$ unless otherwise noted)

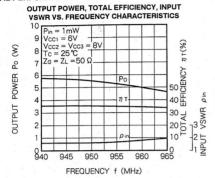
Symbol	Parameter	Conditions	Ratings	Unit
Vccı	Supply voltage		8	
Vcc23	Supply Voltage		10	V
lcc	Total current	$Z_G = Z_L = 50 \Omega$	3	A
Pin(max)	Input power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8.0 V$	2	mW
Po(max)	Output power	$Z_G = Z_L = 50 \Omega$, $V_{CC1} \le 8.0 V$	6	W
Tc(op)	Operation case temperature	Z _G =Z _L =50 Ω, V _{CC1} ≤8. 0V, P ₀ ≤6. 0W	- 20~80	°C
Tstg	Storage temperature		- 40~110	°C

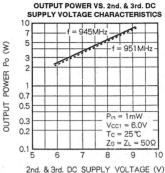
Symbol	Parameter	Test conditions	Limits		11.5
		lest conditions	Min	Max	Unit
f	Frequency range	P _{in} = 1mW Vcc1 = Vcc2 = Vcc3 = 8.0V Z _G = Z _L = 50 Ω	945	951	MHz
Po	Output power		4	and the second	W
η T	Total efficiency		30		%
2fo, 3fo	2nd. & 3rd. harmonics			- 30	dBc
Pin	Input VSWR			3.0	
_	Load VSWR tolerance	V ccz= V ccs= 10.0 V, P o= 5 W(V cci controlled), Load V SWR= $20:1$ (All phase), 2 sec. Z G = 50 Ω	No degradation in output power		-



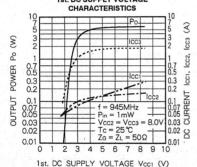
945~951MHz, 8.0V, 4.0W, FM PORTABLE RADIO

TYPICAL PERFORMANCE DATA





OUTPUT POWER, DC CURRENT VS.



1st. DC SUPPLY VOLTAGE CHARACTERISTICS 10 Po 3 5 3 3 2 3 1003 S lcc2, 0.7 0.7 POWER lcc lcc1. 0.3 0.3 0.2 0.2 CURRENT Icc2 DUTPUT 0.1 0.07 0.05 0.1 0.07 0.05 f = 951MHz $P_{in} = 1 mW$ 0.03 Vcc2 = Vcc3 = 8.0V 0.03 Tc = 25 °C 0.02 0.02 $Z_G = Z_L = 50\Omega$ 0.01 0.01 2 3 4 5 6 7 8 9 10

OUTPUT POWER, DC CURRENT VS.

MITSUBISHI SEMICONDUCTORS RF POWER SEMICONDUCTORS 1993



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